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ILLUSTRATIONS.

Portrait of the late Mr. Benjamin Ferrey, Architect 281
Seminary at Clapham for the R C. Diocese of Southwark (with Plan) 293, 294
Courtyard, Eastbury House, Barking, Essex.—Drawn by Mr. E. Clarke, Architect 296
Plan and Details of Eastbury House, Barking, Essex 297
Coffee-Tavern, Milton.—Mr. W. Leonard Grant, Architect 299

CONTENTS.

The Late Mr. Benjamin Ferrey, Architect 281
Healthy Dwellings 283
Exhibition of Metal Work in Paris 285
The Royal Sanitary Commission and the *Builder* in Dublin 286
Metropolitan Railway Traffic 287
V.C. Honour for Saving Life 287
Hay and Corn Drying-Machine 288
The Mercers' Company's New Building in Cheapside 288
A Kindly Workman 288
Building Notes from South Africa 288
British Association at Swansea 289
Glasgow Competition 290
Seminary at Clapham for the Roman Catholic Diocese of Southwark 290
Milton-next-Sittingbourne Coffee-Tavern 301
Eastbury Manor House, Essex 301
The Late Mr. Chas. Lee 301
Wind-Pressure 301
Lead-Mining and Smelting in Derbyshire 302
The Condition of Customs 303
National Insurance 303
Glazed Terra Cotta for Architectural Purposes 303
The Russian Yacht, *Livadia* 303
Obituary 304
Royal Hotel, Blackfriars 304
Social Notes 304
Ye Antient House 304
The Employers' Liability Bill 304
Engineering Items 304
Liverpool News 304
From Scotland 304
Buildings for Poor Law Administration 305
Provincial News 305
"Footings on Another Man's Land" 306
Sewage Irrigation 306
American Notes 306
Continental Items 306
Water Supply 306
London Water Supply 307
Pitch-Pine: Wood for Window-Cills 307
Railway Catastrophes and Workmen's Education 308
Serpentine 308
Drainage in Tottenham and Neighbourhood 308
Church Building News 308
Dissenting Church Building News 309
School Board Schools 309
Proposed Art Museum, Manchester 310
Miscellanea 310

The Late Mr. Benjamin Ferrey, Architect.

BENJAMIN FERREY was born at Christchurch, Hants, on April 1st, 1810, the youngest son of Mr. Benjamin Ferrey, of that town. They were a French Huguenot family, their ancestors having come over to England at the time of the Revocation of the Edict of Nantes, some 200 years since. When quite a little lad, Benjamin Ferrey evinced a taste for drawing, and loved old buildings. Close to his own home he could see a glorious example,—the grand old Priory Church. The sketches he made at the age of thirteen of the interior are very correct in their perspective, and good in touch for one so young. It may as well be said at once that Ferrey eventually became one of the best draughtsmen of his day, being, moreover, very accurate and painstaking. In his two months' tour in 1853, through France, Italy, Switzerland, and Germany, he made many sketches (some of them lithographed subsequently for the Architectural Publication Society). All through his life he was very fond of drawing. Benjamin Ferrey received his education at the Grammar-School at Wimborne, Dorset, where his genial disposition made him a great favourite with the head master (the Rev. James Mayo) and his schoolfellows. He astonished them at times by drawing for hours in the Minster, and the boys were always glad to have a sketch by little Benjamin.

The father wisely resolved to follow the bent of his son's inclination, and placed him with Augustus Pugin—himself, it will be remembered, a French Protestant, who had fled over to England on account of religious persecution. Mr. Pugin had not practised much as an architect, but was a clever draughtsman, and possessed a good knowledge of architecture. He was in the habit of making long tours, and diligently drawing and measuring mediæval buildings, accompanied by several pupils, who assisted him.* In this manner many parts of England and Normandy were visited.

The following letter, addressed later in life to the conductor of this journal, gives some interesting information concerning Ferry's trip to Normandy. It was written with reference to the Lady Chapel at Caudbec:—

"I think I can afford you some indisputable information respecting the construction of the great pendant of this chapel, which may set doubts at rest. I, with Mr. Talbot Bury and others of Mr. Augustus Pugin's pupils, many years ago accompanied that gentleman and assisted him by sketching and measuring the various portions of buildings published by him in his work entitled 'Specimens of the Architectural Antiquities of Normandy.'

I have a most vivid recollection of the intense interest which the elder Pugin felt in the construction of the remarkable pendant of this chapel. I can answer for it that there is nothing in his illustration of it, as shown in Plate 64, but which is perfectly correct. An opening being made through the tufa of the groining at the top, some of us got in, and no little trouble was it to get out again: but with a light there was no difficulty in ascertaining the sizes of the voussoirs resting upon the huge keystone of the groining,

* Most of these distinguished themselves in after-life, not as architects, but otherwise. For example, the late E. W. Cooke, R.A.; the late Joseph Nash, the painter; the late Charles Mathews, the actor. Mr. F. T. Dollman was another pupil who did not forsake architecture, and whose excellent architectural works are well known and appreciated. Another pupil who still survives in the active exercise of his profession is Mr. R. B. Grantham, the eminent C.E.

a monolith of upwards of 17 ft. long. There may probably be some conjecture as to the sizes of the voussoirs built into the external angular buttresses, but in all probability they would correspond with those visible to the eye.

The striking feature, however, of the Lady-chapel, both in execution and effect, is the surprising pendant; its appearance looks quite perilous, and until Pugin with his wonted energy had a hole made and found out the exact nature of the construction, all sorts of notions were prevalent, many believing that iron suspension rods, &c., were employed.

A careful description of the construction ought to have accompanied the plan and sections. Britton, who never saw this chapel, or any of the buildings he describes, could only give meagre accounts, wholly insufficient to exhaust the constructional interest which attaches to them. This was through no fault, but an unexpected illness, which prevented his accompanying Pugin."

In Ferrey's "Recollections" of A. Welby Pugin are many interesting anecdotes of Mr. as well as of Mrs. Pugin. The latter was more severe than the former, and kept the youths in good order. Mr. Ferrey had a keen sense of humour, and in his graphic, animated manner (he was a good mimic) could recount some of the rather severe practical jokes which some of the young men at times used to play on benevolent old Mr. Pugin.

Mr. Pugin, instead of taking all credit to himself for the assistance his pupils rendered him, was in the habit of allowing each one who made the drawing for the lithographer to fix his name, as "So-and-so *delt.*," with A. Pugin *direxit.* in the other corner. In Pugin's "Ornamental Bargeboards," and in his "Gothic Ornaments," a large proportion bear the inscription, "Benj. Ferrey *delt.*" in one corner. There is no doubt that this practice in measuring and closely examining old buildings was of great service in after-years to Ferrey and his fellow-pupils. The knowledge of detail and the good eye for proportion which always distinguished him may be said to have been partly the outcome of his travels with the elder Pugin.

After studying several years in this way, Mr. Ferrey entered the office of Mr. Wilkins for a short time as assistant, and worked at the detail drawings for the new National Gallery. To this association, perhaps, may be attributed the fact that Mr. Ferrey, though originally brought up in a Gothic school, and known as one of the early workers in the Gothic Revival, was never bigoted as regards the Classic styles, with which his pencil was always quite familiar. He never took the strong line that Sir Gilbert Scott did in that respect, though he undoubtedly preferred Mediæval architecture, with which he was more at home.

In 1834 Mr. Ferrey brought out "Antiquities of the Priory Church of Christchurch, Hants," the perspective and measured drawings of which he had been engaged upon for some time. In the literary portion of this work he enlisted the services of Wm. Brayley, and fortunately secured able engravers for the plates. About this time Mr. Ferrey commenced practice in Great Russell-street, Bloomsbury (on the site now occupied by the British Museum). He was soon commissioned by the late Sir George Gervis, Bart., to lay out his estate at Bournemouth (then a place consisting of but a few houses in the midst of fine woods and heath). Though Sir George Gervis, in a prophetic spirit, said that one day Bournemouth would be a great town, few people at that period believed it would develop as it has done. The Bath Hotel and several rows of villas, among them Westover Villas, on the east side of the Bourne, were designed and built under Mr. Ferrey's superintendence. So keenly did he enter into the scheme that he took a house at Bournemouth, and resided for some time there.

In 1836 Mr. Ferrey married Ann, the daughter of Mr. William Lucas, of Stapleton Hall, Stroud-green, Hornsey. One of Mr. Ferrey's first clients was the Rev. Thomas Thurlow, nephew of the great Lord Chancellor Thurlow, of Baynard's Park, near Cranleigh, Surrey. He made extensive additions to his old Tudor mansion. In 1839 he carried out a portion of Dorset County Hospital, Dorchester. In 1841 Mr. Ferrey was appointed Hon. Diocesan Architect, Bath and Wells, a post he held up to the time of his death. His connection with this diocese was seemingly quite fortuitous, as he had no relatives or particular interest in the county, but was introduced there by his friend the late Archdeacon Brymer, Rector of Charlton Mackerel, Somerset. He also obtained work in Dorsetshire through his friend the late Mr. C. Acland Troyte,* a country gentleman and a member of the good old Devonshire family of Acland.

In 1842 the subject of our notice was employed as the architect to superintend the restoration of the nave and transepts, and of the Lady chapel, Wells Cathedral. While this work was in progress Mr. Ferrey took one of the canon's houses for several months. He subsequently carried out for Bishop Bagot extensive additions and restorations to the Palace at Wells (and in later years for Lord Auckland and succeeding bishops, including Lord Arthur Hervey, the present prelate), as well as the restoration of the beautiful chapel there. The additional story to the principal front of the palace is a feature often thought by strangers to be a part of the original design.

Mr. Ferrey was one of the original members of the Architectural Society, and in 1839 became a Fellow of the Institute of Architects (he was one of its oldest members). He afterwards served on the Council and was twice a vice-president.

In the competition for the Houses of Parliament, Mr. Ferrey acted as honorary secretary to the Committee of Architects, and was himself a competitor. In 1843 Mr. Ferrey designed the costly Church of St. James, Morpeth (as well as schools), in the Norman style, a building well thought of in the North of England as a successful adaptation of the grander features of that style.

In 1845 Mr. Ferrey, then considered one of the rising church architects of the day, was commissioned by the Baroness (then Miss) Burdett Coutts to design the Church of St. Stephen, Rochester-row, Westminster. It was a poor neighbourhood, and a church was much wanted there. Handsome schools and a vicarage were also erected about the same time; the whole of these works, carried out at great cost, were due to the munificence of Lady Burdett Coutts.

At this period (about 1847) he had many works in hand, as this note to us will show:—

"As I think you said you would be always glad to have hints of what I am doing in the country, let me say:—

1. I am building a new Governor's house to the Oxford Gaol. It has been designed to form an angular tower in keeping with the rest of the structure.

2. I have reported upon the condition of the fine abbey church at Sherborne, Dorset, in reference to removal of all the existing pewing, and, indeed, the general restoration of the interior.

The noblemen and gentlemen in the neighbourhood take great interest in the work.

3. I have just completed some extensive alterations to the Palace at Cuddesden, for the Bishop of Oxford,—suites of bedrooms, new offices, &c.

An entirely new Decorated chapel, fitted up with good oak dressings and roof; the east window presented by Prince Albert, beautiful glass by Willement; the other windows, presented by the Archbishop of York and others, are by Warrington, Wailes, and O'Connor.

4. Several additions are now going on at the Palace at Wells. In this instance, as above, the Ecclesiastical Commissioners find the money.

I have mentioned these as being *public works*.

In the course of this month [October] there will be three of my churches consecrated,—St. Mary Magdalene, Barnstaple; Melsland Church; St. James, Norfolk.

The Town-hall at Dorchester, which was noticed some time since, is my work."

From 1846 to 1853 Mr. Ferrey principally resided at the Grove, Fair Mill, about a mile from Henley-on-Thames, though still having his offices in town. He always considered this one of the happiest periods in his life, as the society in the neighbourhood was very congenial to him.

Mr. Ferrey had now got into the full swing of practice, and among other works (a list of which is given below) he carried out Penn Wood Church; St. Peter's, Elsted, Hants; Diocesan Training Schools, Saltley, near Birmingham; St. John's, Eton; Buckland St. Mary Church (this is generally considered one of the most successful of his churches, though not the largest); Esher Church; Wynnstay (Sir Watkin Wynn); Bulstrode (for the Duke of Somerset). In 1861 Mr. Ferrey published his "Recollections of A. Welby Pugin," a work which received very favourable notice from the Press, and was read by the public with great interest. He had been engaged on the task for some time, and had long entertained the idea of writing his "Recollections" of this eminent man. About 1870 Mr. Ferrey prepared designs for a proposed cathedral, Victoria, British Columbia, which will probably be carried out before long. In this year he was the recipient of the Royal gold medal, as recommended by the Institute. The last work of Mr. Ferrey was the mansion for the Duke of Connaught, at Bagshot Park, which was commenced early in the spring of 1877. In October of that year he had a slight attack of paralysis, since which he has been in delicate health, though up to the commencement of the present year he had been able to spend three or four weeks occasionally in the neighbourhood of Bagshot, so as to superintend the work, as well as to have the benefit of pure bracing air. Within the last few months, though, mercifully, there was no return of paralysis, weak action of the heart rapidly exhibited itself, with other complications, and at half-past two o'clock on Sunday afternoon, August 22nd, after having lingered several days, he expired quite peacefully and painlessly.

Mr. Ferrey took a great deal of interest in the formation of the Royal Architectural Museum. He also has contributed papers to the Institute of Architects. He was one of the consulting architects of the Incorporated Church Building Society. We have already spoken of him as an architectural draughtsman. He was equally skilful at landscape, and in water-colours could use his brush with much skill. In his holidays he was wont to delight in the latter as a relaxation after his architectural work. He was also extremely fond of music, particularly church music, and had a pleasing baritone voice. Mr. Ferrey, about twenty years or so since, invented and patented a mode of stamping plaster which was inexpensive and very effective. He adopted this process at Macclean Church, near Ampthill; All Saints', Blackheath; Streatham Parish Church (in the chancel), and at other churches.

Mr. Ferrey has had many pupils, several of whom have since become well-known architects.

In 1863 he was elected a fellow of the Society of Antiquaries, and was always proud of the title.

A letter now before us, written early in his career, and which may be usefully printed, refers to a state of things in the profession which is less commonly found now:—

"As a mere matter of fact, you can mention whenever it may suit, that large additions and the erection of a new Episcopal chapel are now going forward under me for the Bishop of Oxford, at the Palace, Cuddesden, near Wheatley, Oxford.

My object, however, in this communication is to suggest whether you may not do a great service to the public and the profession by a temperate statement in one of your *leaders* of the *inconvenience and disadvantages* arising from the union of *architect and builder* in the same person. I could give you many illustrations which I have met with in the course of my own practice; and I could, if I had time to write a long article, point out the many evils of the system. At this time I have three *country* architects who have tendered, and are executing contracts as builders under me. Their position is most anomalous, viz., they proclaim themselves architects and builders, and I have had opportunities of detecting their malpractices in cases where they have acted in the twofold capacity. Indeed, it stands to reason that one of the principal functions of the architect must be sunk when he becomes the tradesman. As to checking expenditure, &c., it is absurd. I believe that the intelligent public are beginning to see this, but I know the influence of the *Builder* is very great; I see it upon every gentleman's table in the country, and they would at once see the force of the arguments which might be advanced, if you think it would be consistent to say something upon the subject. In the case of a respectable builder, I have no hesitation in permitting him to trace any drawings he pleases, because they are essential to him in the performance of his duty; but it is too bad that the architect and builder should take his copies for carrying work into execution, and then, as *architect* only, at some subsequent day, make use of others' designs.

I do not make these remarks in disparagement of the builder. I respect him in his position as much as anybody, but upon principle I feel annoyed when I see him *acting two parts*. A man should be either a builder or an architect, but the joint pursuits is highly objectionable. The practical part and the occupation of building is an ample pursuit for one man, without his meddling with the artistical and theoretical branch. It is however, unnecessary that I should say more upon this point. I am led to advert to it now because I have found it necessary to refuse the *tender* of a man who calls himself an *architect*. I feel that I cannot exercise proper control, and am fettered when dealing with such a person.

I am confident that the *Builder* may advocate right principles without any fear of losing support from a class, and indeed all the respectable builders with whom I am acquainted deprecate strongly the course I have adverted to. They rightly believe that it is for the benefit of the employers themselves that they are under the superintendence of an architect, as relieving them from *much responsibility*, independent of the many other objections that could be named.

P.S.—I should be glad on some opportunity to give you a few facts bearing on the above topic; I am sure that a great saving is effected by the employment of an architect; some employers fancy they save five per cent. by dispensing with a professional man,—this is a great delusion."

Benjamin Ferrey, with his pleasant countenance and winning manners, gained many clients, and in most cases his clients became afterwards his personal friends. With young architects he was always very popular, and many could bear testimony to his good nature and willingness to help them in any difficulty by the aid of his experience. In domestic life his evenness of temper was characteristic. In December, 1872, Mr. Ferrey married Emily, daughter of the late Mr. William Hopkinson, who survives him. By his first wife he leaves three children, a son and two daughters. The son, Edmund Benjamin, who has been in practice for about ten years, jointly with his father, and on his own account, has taken the prin-

* Whose name is well known as author of several of the "Hymns, Ancient and Modern."

cipal part in the business since Mr. Ferrey's illness in 1877, and promises to be an efficient successor. Mr. Ferrey was buried in the same grave as his first wife at Highgate Cemetery, on August 27th, the funeral, in accordance with the wish of the family, being kept private.

List of the principal works carried out by Mr. Benjamin Ferrey since the year 1834 (in the later ones his son was associated with him):—

Mansions.—Bagshot Park (Duke of Connaught), Wynnstay (Sir W. W. Wynn, bart.), Bulstrode (Duke of Somerset), Huntsham Court, Devon (Mr. C. A. W. Troyte), Datchet House (Mr. W. Good); Bude Haven House (Mr. Arthur Mills); Streatham (Mrs. Hamilton); Park Side, Wimbledon (Mr. W. Williams).

Mansions (Alterations and Additions). — Luton Hoo (Marquis of Bute); Baynard's Park, Horsham (Rev. Thomas Thorlow); Brogyntyn, Salop (Lord Harlech); Bridehead, Dorchester (Mr. Robert Williams); Bishop's Palace, Wells (successively for Bishop Bagot, Lord Auckland, and the present bishop, Lord Arthur Hervey); Brandon Lodge (Lady Beresford); Cefn Park, North Wales (Sir Roger Palmer, bart.); Putney Heath (Mr. R. Williams); Fitzroy Farm, Highgate (Earl of Dufferin); Killaleagh Castle, Ireland (Earl of Dufferin); Frampton Court, Dorchester (Mr. R. B. Sheridan); North Aston, Oxon (Mr. W. H. Foster-Melliar); Hatch Park (Mr. W. H. P. Gore-Langton, M.P.); Knowle, Surrey (Sir William Hanham); Herbert, Hon. Sidney; Peniarth House, North Wales (Mr. W. W. E. Wynne); Poltimore Park (Lord Poltimore); Park Hill, Henley-on-Thames (Mr. Rhodes); Riby Grove, Lincolnshire (Colonel Tomline).

Public Buildings, &c.—Saltley Training Schools, near Birmingham; Ascot Grand Stand (dining-room, booking offices, &c.); Cambridge Mausoleum, Kew-green; Royal Cambridge Asylum, Kingston-on-Thames (commenced by the late Mr. Allom); Dorset County Hospital and Chapel, Dorchester; Schools, Vicarages, Railway Stations, on Lord Dufferin's Estate, Ireland; Almshouses, Kirtling, Oxon; Diocesan Schools, Oxford; St. John's Foundation School, Leatherhead, and Chapel (jointly with Mr. J. H. Good, architect); Luton Town-hall; Grammar School, Henley-on-Thames; Shepton Mallet Almshouses, Somerset; Almshouses, Dorking; Town-hall, Dorchester.

Schools.—Beanham; St. Mary's, Batternea (Wandsworth-common); Buckland Newton, Dorset; Bala, North Wales; Ceddington; Linslade; Chetwynd, Salop; Cuckfield, Sussex; Llanuwchyn, North Wales; Darshill, Somerset; Dowlish Wake, Somerset; Geddington; Henley-on-Thames: Lower Slaughter, Gloucestershire; Llanfachreth, Merioneth; St. Mark's, St. John's-wood (jointly with Mr. J. H. Good, architect); Netherton, Northumberland; Overton, Oxon; Otterton, Devon; Romsey, Hants; Sidlesham, Sussex; St. Stephen's, Rochester-row, Westminster; Oakhill, Somerset; Taunton (St. Mary Magdalene); Upper Tooting, Surrey; Esher, Surrey; Westbourne, Sussex; Wargrave, Berks; St. John's, Angell Town, Brixton; Morpeth, Northumberland; Great Bedwyn, Wilts.

Parsonages.—St. John's, Angell Town, Brixton; Compton Vallence (jointly with Mr. Crickmay, architect), Grazeley; Cattistock, Dorset; Charlton Mackerel; St. Paul's, Dorking; St. John's, Eton; Fitzhead, Somerset; Hounsdown, Hants; Henley-on-Thames; Kirtling, Oxon; Keresley and Coundon Vicarages; Little Milton, Oxon; Mentmore, Bucks; Maiden Newton, Dorset; Melrose, Scotland; New Shoreham; Nuthurst, Sussex; Overton; Pishill, Oxon; Penn-street, Bucks; Romsey, Hants; Stanton, Wilts; St. Stephen's, Rochester-row, Westminster; Stanford; Lower Tooting; Tarrant Hinton, Dorset; Wheatley, Oxon; Warkton, Northants.

New Churches.—Shepherdswell, Kent; Brighton, St-Ann's; Coldharbour; Ascot-heath; All Saints, Blackheath; Ashurst, Sussex; Burton, Hants; Brightwell; Barcombe, Sussex; St. John's, Brixton; Brockhamgreen, Sussex; Bengeo, Herts; Birlingham, Worcestershire; Bala, North Wales; Buckland St. Mary, Somerset; Christ Church, South Banbury; Cefn, North Wales; Christ Church, Clapham; Christ Church, St. Giles's; Christ Church, Kensington; Christchurch Cemetery Chapels, Hants; Chetwynd, Salop; Dogmersfield, Hants; St. Mark's, Old-street, London; St. Paul's, Dorking; St. John's, Eton; Esher, Surrey; Christ Church, Eastbourne; Cemetery Chapels, Eastbourne; Fauls-green, Salop; Guernsey; Hillingdon Cemetery Chapels, Middlesex; Hale, near Farnham; Hounsdown, Hants; Holdenhurst, Hants; Harpsden, Oxon; Kilgerran, Pembrokeshire; Lower Slaughter, Gloucestershire; Linslade, Herts; Llanfachreth, Merioneth; Llangedwyn, North Wales; Little Briddy, Dorset; West Lydford, East Lydford, Somerset; Lufton, Somerset; Episcopal Church, Melrose; Melplaish, Dorset; St. John's, Morpeth; Otterton Devon; Pett, Sussex; Penn-street, Bucks; Holy Trinity, Roehampton; Slinfold, Sussex; Sandbeck Private Chapel Yorkshire (Earl of Scarborough); Sambrook, Salop; Immanuel Ch., Streatham-common; St. Stephen's, Rochester-row, Westminster; Vobster, Somerset; Whitchurch, Hants; West Hatch, Somerset.

Church Restorations and Additions.—Wells Cathedral: nave and transepts and lady-chapel, 1842; west front and towers, 1870-74; St. Mary Magdalene, Taunton (tower rebuilt—G. G. Scott and B. Ferrey, joint architects); Christchurch Priory Church, Hants; Ackworth, Yorkshire; Abbotsbury, Dorset; Binfield, Berks; Brislington, Somerset; Babcary, Somerset; Barkway, Herts; Bransgrove, Hants; East Coker, Somerset; St. Lawrence, New Brentford; Chipstable, Somerset; Chobham, Surrey; Romsey Abbey (north transept, &c.); Cookham, Berks; Castle Cary, Somerset; Craich, Derbyshire; Corwen, North Wales; Corston, Somerset; Chislehurst, Kent; Charlton Mackerel, Somerset; Down Amney, Gloucestershire; Dowlish Wake, Somerset; Eling, Hants; Huish Episcopi, Somerset; Enmore, Somerset; Trinity Church, Eastbourne; Frampton, Dorset; St. George's, Hanover-square; Higheliffe, Hants; Henley-on-Thames (parish church); Huxham, Devon; Isle Abbot (rebuilding of tower), Somerset; Keresley, Staffordshire; Kelston, Kingswood, Hants; Limington, Somerset; Llanwrin, North Wales; Langford Budville, Somerset; Long Ashton, Somerset; Martock, Somerset; Meifodd, Merioneth; Merriot, Somerset; Merton, Surrey; Maulden, Beds; Ruabon, Denbighshire; Sotherton, Suffolk; Scropton, Derbyshire; Southbourne; Stamfordham, Northumberland; Streatham (parish church), Sopley, Hants; Sandymount, Ireland; Crom Church, Ireland; Tyneham, Dorset; Thames Ditton, Surrey; Upton, Bucks; Up-Ottery, Devon; Wichnor, Staffordshire; Westbourne, Sussex; Warmington, Northants (chancel), Wingham, Kent; Wrexham, North Wales; Wanstrow, Somerset; Ystrydgynlais, South Wales.*

HEALTHY DWELLINGS.

THE book published under this title† by Captain Galton seems calculated to fill a special place in the literature of the subject. It is not a book giving details and diagrams of methods of drainage, trapping, &c.; it is one in which the principles to be considered, and the best methods to be employed in regard to the whole subject of the sanitary conditions of dwellings, are generally treated of in one volume and in relation to one another, giving a kind of *coup d'œil* of the subject of sanitation. While in other practical treatises we have the subjects of drainage, of water supply, of ventilation, &c., separately gone into and illustrated in detail, we have here the outlines of all these various branches of the subject considered in relation to each other, and within the compass of a comparatively small volume.

Practical sanitary science, says the author in his preface, is embodied in the words "pure air, pure water," and these include a pure subsoil. This latter is, therefore, to be regarded as the basis of the whole, and receives the first consideration in a chapter on the conditions which regulate the healthiness of a site. There is a great deal of information collected in this chapter; some of it of course is familiar to everyone who has paid any attention to the subject, some of it may be new to a good many readers, even among those who are not unacquainted with sanitary matters. This is followed by a chapter on the effect of soils and local conditions on the healthiness of site. The author commences by quoting Dr. Parkes's scale of relative healthiness of various classes of site; "primitive rocks, clay slate, and millstone grit," standing highest, and marshy land lowest. But he is careful to point out that the advantage of a naturally healthy site may be all thrown away and become practically non-existent. "During the first visitation of cholera, one of the places which suffered most severely, owing to its filthy local conditions, was Megavissey, on the granite formation of Cornwall." This fact as to the influence of the habits of a population on the prevalence of an epidemic, is, of course, almost proverbial now. Another example given is, however, more out of the way of ordinary experience. This is the case of the erection of a military sanitorium on the granite peninsula of Kowloon, in China, which seemed to possess every requisite for health in its geological formation and its free exposure to winds; yet the troops on being moved into the huts there suffered severely from fever. "This arose from the disturbance in a tropical climate of the surface soil impregnated with decaying organic matter. Until soil of that nature has been opened and oxygenised it is in the highest degree deleterious." For similar reasons the removal of brushwood in the vicinity of a camp, though highly desirable in the long-run, has been found to cause fever in the first instance, owing to the disturbance of decaying organic matter. In this and some other points in the book, Captain Galton's experience as a military engineer comes in usefully, and leads to the suggestion of conclusions from facts which are less within the range of the civil sanitary reformer's usual experience. An instance from the experience in the camp at Balaclava as to the relative healthiness of two methods of placing dwellings on a slope (illustrated by sections) is one of the most direct and practical examples that could have been brought forward of the influence of site and drainage on health, and one that can be understood and appreciated by every reader. Another point brought forward in this chapter, and which is certainly sometimes overlooked, is that a hilly site, even with good subsoil and exposed to breezes, is not necessarily healthy if the wind comes to it over a stretch of plain deficiently drained or otherwise unhealthy in its conditions. The elevation of the site does not raise it above the risk of contamination from the lower ground.

In the chapter on the healthy arrangement of buildings on a given area some interesting comparisons are drawn between the conditions of eastern and western towns, and the conditions of camp life as compared with life in built towns. The density of population in a camp area on active service is very greatly in excess of even the highest densities of population in London and other large towns, and this without either drainage or paving. The difficulty of preserving sanitary conditions under such a state of things when the camp is anything more than a merely temporary one, is, of course, obvious, and the conclusion that no one site should be occupied for more than a limited period is inevitable. The author considers that the continued occupation of Aldershott as a camp, on a porous soil, without paving or adequate drainage round the tents, is leading to a gradual deterioration of the health of the camp. He does not give the density of population of Aldershott Camp, but we presume it is considerably below that which is frequent in camping on active service. A good deal more attention, however, is now paid to the sanitary arrangement of camps than used to be the custom; and those who read General (then Colonel) Pearson's letter from his camp at Ekowe, detailing its arrangements to the Commander-in-chief, must have been struck by the practical care which was given by this prudent as well as spirited officer to the arrangement of his camp so as to get the best sanitary conditions attainable under unavoidably unfavourable circumstances, where a number of men were put in a comparatively small area without the possibility of change of place or change of air.*

The remarks on the purity of air in an occupied dwelling, and the various influences which may interfere with it, should be read with attention, and suggest a great deal. In London it is observed there are special conditions arising from the large amount of suspended organic matter in the air; an important factor in which is the ammonia given out by the manure from the enormous quantity of horses kept in London, and continually traversing the streets during the day. The author tells us that the mud from a paved street in London was found on analysis to contain nearly 90 per cent. of horses' dung, and that the mud on the new wood pavements consists of it almost entirely: but in a macadamised street there surely must be a very large amount of mere detitrus arising from the grinding down of the material by the wheels. A fact in regard to wood pavement is brought up again which is of some interest now that this pavement has come again so much into use. It is that the wood pavement laid down in Regent-street about thirty years ago was taken up because it had become so saturated with ammonia that the emanations tarnished the plate in the silversmiths' shops. Captain Galton does not give the time which the paving had been down before arriving at this state. The same evil has been pointed out in America.

The chief difficulty of ventilation is summed up in the course of a chapter on cubic space and floor space, as consisting in the necessity of avoiding draughts. "Everyone approves of ventilation in theory; practically no one likes to perceive any movement of air." Thus a great deal of our ventilation in ordinary houses is really done accidentally, through crevices around doors and windows which theoretically in many cases should not exist, and which are not taken account of, but without which a sleeping room, under the usual conditions of closed windows and drawn curtains, would be unbearable, and positively injurious before morning. This is a point to be considered, we may observe, in reference to the employment of concrete houses with a finished and close outer skin, as described in a recent article in our columns. The experience there mentioned of one who had resided in such a house on an exposed situation, that a gale of wind might be blowing outside, and the inmates hardly be

* Of the above-mentioned works, the following have been illustrated in the volumes of the *Builder* for the years indicated, viz.:—Christ Church, Endell-street, Long-acre (1845, p. 114); St. Stephen's Church and Schools, Rochester-row, Westminster, built at the cost of the Baroness Burdett Coutts (1847, p. 359); interior of St. Stephen's Church, Westminster (1850, p. 516); St. John's Church, Angell-town, Brixton (1853, pp. 296-7); St. John's Schools, Canterbury-road, Brixton (1853, p. 360); St. Paul's Church and Parsonage, Dorking (1857, p. 755); Bulstrode, Buckinghamshire, one of the seats of the Duke of Somerset (1861, pp. 860 61); Pulpit, Church of St. Mary Magdalene, Taunton (1867, p. 608); mansion, Bagshot Park, Surrey, for H.R.H. the Duke of Connaught (1877, pp. 1198-1200).

† Observations on the Construction of Healthy Dwellings, namely, houses, hospitals, barracks, asylums, &c. By Douglas Galton, late Royal Engineers, C.B., &c., &c. London: Henry Froude; Oxford: Clarendon Press. 1880.

* Since these words were written, a letter has appeared in the *Times* giving an extract from the correspondence of a young officer serving in the present Afghanistan campaign, from which it appears that a camp was pitched on one occasion among the carcasses of dead and putrefying camels. We imagine, however, that this is quite an exceptional instance of carelessness or stupidity.

conscious of it, shows that there was very little of what we may term natural ventilation in such a building, and that with impervious wall-material and tight fitting of windows and doors comes the increased necessity for sufficient systematically-arranged ventilation.

Captain Galton's remarks on the details of ventilation are preceded, very logically, by the consideration of the movement of air, a subject which people who are speculating in ventilating processes would do well to consider more fully than they usually do. The author is not in favour of mechanical means of propulsion or expulsion of air, except in special cases, and points out that not unfrequently propulsion of air into an apartment in this way results in a strong current towards the nearest outlet, leaving stagnant portions of unchanged air in the sides and angles of the apartment. It is just as well that some one should draw attention to the fact that inlets for ventilation should be so arranged as to disperse the introduced current throughout the room as much as possible; for this self-evident fact (as one would think it) seems to be beside the comprehension even of some people who professedly deal in ventilation; and not long since we saw an arrangement for ventilating recommended on the ground (partly) that it sent the current as direct as possible from the inlet to the outlet. Captain Galton has no special panacea in ventilation to recommend; he examines and states briefly the principles on which ventilation should be based, and has various suggestions to make in regard to what may be called the common sense of the subject. The channels that admit air should, he observes, be short, direct, and accessible; "long channels collect dirt, and form a refuge for insects; but if it is necessary to make them long, they should be easily accessible for cleaning;" a very simple and obvious consideration, often entirely forgotten. This, we may observe, is one drawback to the upright tubes for ventilation which were *re*-invented a little while ago, and the idea of which was suddenly seized upon with such avidity and unanimity by a press and a public who seemed never to have heard of ventilation before, and imagined that this expedient was the be-all and the end-all of the science. The author is in favour of the Sheringham ventilator as a simple but effective form, capable of being used both as inlet and outlet. Another point on which he is particular is in regard to drawing the air for inlet ventilation from a quarter where it will be found as pure as possible: another simple consideration, often absurdly overlooked, people seeming to think that air is air, wherever it is drawn from, and that they may let impure air in as ventilation (because they cannot see its impurity), though they would not think of putting dirty water in their washhand basins or baths. One point which the author alludes to especially is that, as a general rule, air drawn from a high level is better than that drawn from near the ground; he instances the Houses of Parliament as a case in which the opportunity afforded for doing this by the lofty tower has been neglected. The House would be supplied with better air if it were drawn down from the top of the Victoria Tower, and the tower would be useful as well as beautiful. We may note that the French Chamber is so ventilated, the air being drawn down from a height of nearly 100 ft.

In the course of observations on warming we have the mention of the system experimented on at Lockport, U.S., by which 200 houses were heated by steam from a central boiler, the steam being arranged so as to be turned on or cut off in each house and (if we understand right) in each apartment, as wanted, in the same manner as gas laid on to the houses. The idea of laying on heat in a town, just as gas and water are laid on, has not infrequently tempted the imagination of scientific socialists, but we fear that, however convenient in certain circumstances and over a limited area, the idea of a general application of heat in this way on a large scale is chimerical. It is beset by a difficulty of the same kind, in the first place, as that which at present affects the general use of electric light, viz., the diminution of power in proportion to the distance from the point of origination. Gas and water are gas and water still, and unchanged in their composition and utility, at any distance at which pipes can deliver them; but steam and hot water are parting with their heat all the time of their passage from the boiler to the point where it is to be utilised. But besides this, there is the difference in the way in which their heat can affect the apartment to which it is introduced, which must put such methods at a disadvantage in comparison with ordinary fuel and fire. Captain Galton puts this very plainly at the conclusion of his general observations on warming: "Where a room is heated by warmed air passed through flues into the room" (and this practically includes the case of pipes placed in hot-air chambers and sending warm air from them), "the air imparts its heat to the walls. The air is thus warmer than the walls. When a room is warmed by an open fire, on the other hand, the warming is effected by the radiant heat from the fire; the rays from the fire pass through the air without sensibly warming it, the radiant heat warms the walls and furniture, and these impart their heat to the air. Therefore the walls in this case are warmer than the air." The consequence is that the walls and furniture cannot, by conducted heat, be kept in cold weather as warm as is desirable without raising the air to a temperature both unpleasant and unhealthy. The author thinks, however, that in a room warmed by steam-pipes heated to a high temperature, the effect on the walls would tend to approximate in some degree to that produced by the open fire, in proportion as the temperature of the pipes is raised. We may suggest that the same result might be attained by the systematising of a plan which has once or twice been tried, namely by fire-clay lumps heated by a gas-flame. If the supply of every house in a town with heat from a common source, in the same way in which gas and water are supplied, be ever accomplished on a large scale, it would be more likely to be done through the medium of inflammable gas than by any other medium now known to us, but a supply from such a source would not be healthy unless the fumes of the gas could be kept out of the room. To make gas the means of heating some slow-conducting substance, through which heat would be imparted to the room while the gas-flame itself would be kept from all contact with the air of the room, seems an idea that offers more chance for the working of a system of heat supply than any other; and if the electric light be destined, as we believe, ultimately to supersede gas as a means of lighting, it may perhaps come to pass that coal-gas, superseded for this purpose, may turn out a valuable means of heating, and be thus utilised to even better purpose than it has been hitherto, and in such a way that its more disagreeable qualities may be kept out of sight. The bearing which such a system would have on the prevention of smoke is obvious.

But the method of warming a room affects also the working of its ventilating system, if it has any; or may even be said to produce a ventilating system where there is none. There is therefore the more advantage for general readers in a treatise in which the two subjects of warming and ventilation are considered almost simultaneously and in connection with each other. The difficulty with the open fire is that while it assists ventilation when in operation, the fireplace may, when not in use, entirely change its function, become an inlet instead of an outlet, and throw all the arrangements for ventilation out of gear. It is in respect of such a condition of things, again, that gas in connection with the heating apparatus might become so useful, being so easily regulated, in securing a sufficient heat at any required moment to create an up-draught for ventilation without producing more heat than is wanted. But this is by the way. In dealing with the open fire-grate while in operation the question is how best to produce and to radiate heat economically, to prevent smoke, and assist ventilation. The idea of feeding the ventilation of the room by air warmed in its passage into the room by contact with the fireplace is of course quite a common-place now, but the whole object is not accomplished so well or in so compact a manner in any invention that we know of as in Captain Galton's fireplace, figured in the plan, section, and elevation on page 126. The excellence of this fireplace is well known to those conversant with the subject, yet we believe it has come comparatively little into use, perhaps for the reason mentioned by its inventor—it has never been patented, and therefore manufacturers do not care to suggest its use. There is another reason, however, and a strong one, the impression (too much founded on fact) that it is scarcely possible so to cleanse the entering air in towns as to prevent it from soiling and spoiling the apartment. The principle (to mention it once again) is that of introducing air to a chamber at the back of the fire, where it is warmed by blocks of fire-clay, which form the sides of the chamber and the back and sides of the fireplace, and thus warmed, ascends a shaft, which delivers it into the room, as air-supply, near the ceiling, from whence it circulates through the room, and eventually comes to the grate to feed the fire, and go off up the smoke flue, or what may, for the most part of the time that the fire is burning, be called the hot-air or extraction flue, for the prevention of smoke is facilitated by the introduction of air through a slit in the back lining of the fireplace, so as to give an extra supply of air at the point of combustion, on much the same principle as the "split-bridge" in larger furnaces, which in one or another modification has proved the most effectual means of preventing smoke in such furnaces. This fireplace we take to be, for the combined purposes of heating, smoke prevention, and ventilation the best that has been invented. We looked with some curiosity to see what the author had to say about the functions of his fireplace when not in use, in regard to ventilation. From the passing suggestion that "the inlets for warmed air may be provided with valves, to be closed when the fireplace is wanted rather for ventilation than for warming," it is evidently calculated that when windows are open in warm weather the fireplace flue is to act as an outlet, as before. We should imagine the provision for a gas-jet at or in the chimney opening would be necessary to insure it thus acting. We will sum up, however, in the author's own words, the advantages which he claims for his grate, and all which we believe to be justly claimed:—

"1. That it ventilates the room.

2. That it maintains an equable temperature in all parts of the room, and prevents draught.

3. That the heat from radiation is thrown into the room better than from other grates.

4. That the fire-brick lining prevents the fire from going out, even when left untouched for a long time, and prevents the rapid changes of temperature which occur in rooms in cold weather from that cause.

5. That it economises fuel partly by making use of the spare heat, which otherwise would all pass up the chimney, and partly by ensuring by its construction a more complete combustion, and thereby diminishing smoke.

6. That it prevents smoky chimneys by the ample supply of warmed air to the room, and by the draught created in the neck of the chimney."

Clause 2 seems, by the way, to be sufficiently included in the terms of clause 4. In considering the ventilation of rooms without open fireplaces, and in combination with a warm-air system, the author gives a great many useful and suggestive hints. In regard to theatres he draws attention (for which unfortunate actors will thank him) to the facilities which the necessarily large employment of light in connexion with the stage affords both for warming and ventilation, light being at present necessarily connected with heat, which on the stages of most theatres is probably not utilised at all either for warmth or ventilation; adequate ventilation of a theatre will, however, he thinks, be more satisfactory if some mechanical appliance be used to force in the fresh air as well as to remove the vitiated air. A good while since we published a translation of a complete plan proposed by a French architect for the treatment of theatre ventilation, in which the air was to be kept slightly in a state of compression in the house, so that all draughts (if any) on the opening of doors would be outward rather than inward, and the dangerous effect of draughts on people clad in evening dress, or even with better protection in the way of clothing, would be obviated. This was suggested as an extra and accompanying advantage in the employment of propulsion in theatres: another advantage, as recent experiments in the States seem to have decisively shown, is in the better acoustic properties of the house, or rather the marked assistance to its acoustic properties realised when the incoming current for ventilation is propelled from the stage towards the spectators. In the most costly and elaborate of theatres, the Paris Opera House, however, mechanical propulsion is not made use of; hot-water apparatus is used behind the stage, "on the assumption that this method does not dry the air so much" (a very gratuitous assumption, we should say, when the water has no connexion whatever with the air to be warmed, unless it was thought that aqueous vapour percolated through the substance of the heating pipes), "and the part of the house occu-

pied by the public is warmed by stoves, as being quicker in operation." In saying that it is warmed by stoves, Captain Galton of course means that the air is thus warmed in chambers before admission to the house. The description of the ventilation and warming in the Herbert Hospital is worth attention, as it seems to be very efficient, complete, and simple in working; but we can merely refer to it. One observation at the conclusion of the ventilation chapters should be noted:—"No system of ventilation or warming in a large building or establishment can be satisfactorily conducted unless some person is charged with the duty of seeing that it is maintained at all times in effective action."

To say that "the laws regulating the movement of air should govern the form of buildings," is perhaps rather too round a statement, though the chapter on "the internal arrangement of buildings" recapitulates some points in which this is more of a logical sequence than many readers would suppose. To say that a building must be so planned that air may have free access to every part of it is of course a truism, though one which is not unfrequently forgotten. We have been frequently struck, for example, with the want of ventilation in the central staircase even of recently built and costly houses, especially among some of those numerous houses in flats which have come into use in the Pimlico district and elsewhere. Many of these are built with the stairs, from which all the various tenements open, closed by a fixed skylight at the top, so that in hot weather especially there seems not only an absolute stagnation of air in the upper stories of the staircase, but even an accumulation of fouled air which has risen to the top of the staircase shaft and has no exit; and it must be remembered that change and circulation of the strata of air are much less liable to go on spontaneously in a high narrow funnel like a staircase shaft than in a space of the proportions of an ordinary room. A point to which our author alludes, and which is not so familiar, is that fires frequently spread with greater rapidity than they otherwise would do in English houses through the facility afforded for currents of air to pass from one floor to another behind the boxing of windows, the battening on walls, &c. He urges that "the free passage of air should be stopped as far as possible between every room and the room under and over it, by means of some substance difficult of combustion." Among other means of checking the spread of combustion he recommends especially a course of fire-clay slabs below each floor level projecting 6 in. into the rooms and receiving the ends of the beams carrying the floor above; the under side of the fireclay (or terra-cotta) being moulded and occupying the place of the sham plaster cornice which now forms the usual connexion between the wall and the ceiling of a room. Captain Galton apparently contemplates only double-framed floors, with beams carrying joists above and ceiling joists below, with an air space between. This is all very good, no doubt, but it must be remembered that this means a great deal of expense, and it could hardly be carried out in buildings where economy in both money and space must necessarily be consulted. In the course of the remarks on the internal arrangement of buildings, in which we concur in the main, some special attention is given to the sanitary construction of stables, and the entire want of attention, often, to the provision of adequate ventilation and fresh air for the horses, both in sufficient quantity and in the places where it is wanted. The entirely accidental way in which some new stables are constructed, or old ones left unaltered and unimproved in this respect, would lead one to conclude that horses were not supposed to live by respiration in the same way as human beings. Captain Galton gives small-scale plans (by the way, there is no scale to them) showing where he considers air should be especially introduced to provide for every horse having pure air to breathe both when he is standing and lying down, which we recommend to the reader's attention. Perhaps some of the diseases to which horses are subject, and which are the dread of the horse-owner and the puzzle of the "vet.," may be traceable, if the truth were known, to nothing more far-fetched or mysterious than the want of proper air to breathe.

There are one or two points we rather question in the remarks on "conditions affecting materials and construction." Damp courses of slate (recommended among other means for preventing damp rising) are liable to breakage with the slightest unequal settlement of the wall, and are therefore not to be trusted. Further on, "a floor of wooden blocks laid on and bedded in asphalte combines dryness with warmth for the feet." It may do so, but it almost certainly ensures the rapid decay of the wood so imbedded. These, however, are minor points. Some statistics as to the amount of water which is held in new walls will startle some readers, and explain pretty forcibly to those who are going into new houses why it is not wise to be in too great a hurry to commence occupancy. According to Captain Galton's calculation, a house in which 100,000 bricks have been used, contains in the bricks and in the mortar combined about 10,000 gallons of water, which must be removed from the walls of the house by evaporation before it becomes habitable. Some of this will be escaping, no doubt, from the lower part of the wall while the upper is in process of building, but not much; the greater part will still have to be accounted for when the roof is put on. Another fact mentioned about plaster is suggestive: it was stated in a discussion at the French Academy of Medicine in 1862 that in a case in which an analysis had been made of the plaster from the wall of a hospital, this was found to contain 46 per cent. of organic matter. It ought to be stated, however, to what depth the plaster was cut for the analysis. We can well imagine the plaster being loaded with organic matter in this proportion to a depth of ¼ in. or even more, but not throughout its thickness; the question is, how far did the organic substances actually permeate? This is the more important, because some leading sanitary authorities have suggested that the best internal wall-finish for a hospital ward is not a hard and washable material, but an ordinary plaster coating, which should be scraped and resurfaced from time to time; but the efficacy and suitability of this treatment depend, of course, on the degree to which the impurities penetrate into the plaster: if they are merely superficial, the process is easy and satisfactory; if they penetrate deep, the renewal of the plaster throughout would be necessary,—a by no means convenient necessity. We should have more faith ourselves in a smooth wall-facing which would hold far less of organic matter at all times than plaster, and which could be thoroughly cleansed by washing, while the ward was empty, as every hospital ward should be, by rotation, for about a month in each year. The great thing to remember in regard to impervious materials is, that the more completely impervious they are, the more complete must be the provision for cleanliness and ventilation. Captain Galton comments on this again in regard to impervious roofs or ceilings. Experience, he says, shows that it is unhealthy to live under a ceiling impervious to air. "Air heated by contact with the human body carries up emanations which when they rest on a pervious ceiling are retained there, while the moisture passes off through the ceiling; on the contrary, if these emanations come in contact with an impervious ceiling, they are not absorbed, and may be again brought into circulation in the air of the room. Consequently, if circumstances render it necessary to have a ceiling impervious to air and moisture, this must be discounted by providing under such impervious covering additional facilities for change of air in the upper part of the room." For ourselves, we should decidedly prefer and recommend the impervious ceiling with the thorough ventilation; but we admit that it is more difficult to carry this out satisfactorily. But to trust to the pervious ceiling for retaining what we do not want to have returned upon us, seems rather like shirking a difficulty than fairly meeting it.

The author commences his remarks on "Removal of Refuse," by saying that "a theoretically perfect system of refuse removal would be one where a large volume of rapidly-flowing water received the whole refuse, and carried it away, before it had time to decompose, to a large river not used for drinking purposes, and thence to the sea; but this is generally unattainable, and it would leave the waste matter unutilised." As this latter objection is made in the same sentence, it seems rather odd to call this a theoretically perfect system; and it is so desirable to emphasise in this country the danger and folly of sending sewage into rivers, that it is a pity that the author should have seemed to countenance it even under the restriction which he makes. In fact, the restriction is not sufficient, for it is a great evil to the dwellers on the banks of a river to pollute it with sewage, even if they are not going to drink the water; and the whole sentence, so prominently placed, surprises us. We should say a theoretically perfect system was that which conveyed away refuse matter as quickly as possible to where it would be useful, and we have to find out where or in what conditions that is. Chemistry will tell us in the long run, no doubt, but we have not mastered the subject yet. Captain Galton's military experience enables him to give some useful suggestions for the management of extempore latrines, &c., in circumstances where rough-and-ready methods alone can be used; for the rest, the principal systems of removal of house-refuse, by water-closets and sinks, by the dry-earth midden system, and the pail system, are briefly explained, and some of their respective advantages and drawbacks mentioned, but the author does not positively recommend any one system or apparatus, except that he decidedly prefers the pail system (two or three modifications of which are described) to any more wholesale system of removal without water-carriage. The Liernur system is described, and some probable drawbacks to its working suggested; but one obvious objection might be added, that of compelling the employment of yet another elaborate system of underground piping in large towns. Most towns have already three systems of pipes,—gas-supply, water-supply, and drains; and these are enough, in all conscience, to keep in order and provide for, and rather too much in some cases.

This portion of the book, considering the great difficulty, elaboration, and importance of the subject, must be considered but very brief and rudimentary, but it will serve to give general readers an outline of the main difficulties and the principles on which they are to be met. The value of Captain Galton's book is most apparent as a whole, in giving a general and trustworthy view of the subject of sanitation, such as ordinary unscientific readers can understand and take interest in; and in this way it may conduce much towards the enlightenment of the unscientific public, while it contains every here and there hints and experiences which may prove very suggestive to the scientific specialist in sanitary reform.

THE EXHIBITION OF METAL-WORK IN PARIS.

FROM the slight glimpse that we have had within the last few days of the retrospective museum which was announced to be opened three weeks since, we certainly have no reason to regret the delay that has been occasioned by the arrangement of a collection of a series of works of art the like of which has not before been brought together through the long annals of great exhibitions. With the knowledge of the treasures that have been reposing in their cases in the rooms on the first floor of the Palais de l'Industrie, it has been so far sorry work, however instructive, to have to inspect the modern productions down below. Not but what they supply ample matter for inquiry and study,—they indeed should form the chief interest of the exhibition,—but without the means of comparison with older works, such as the museum is purposely intended to facilitate, it is difficult to form a correct estimate of the merit of the modern French metal-workers, whose art is very completely represented here; in this respect every credit is due to the management of the exhibition, which has gathered together such a characteristic show, and one so essentially connected with the industrial application of art. The marvels of modern ingenuity, such as iron has enabled the manufacturer, the engineer, and the architect to carry out, are here unrepresented, a feature, the absence of which is not to be regretted in an exhibition organised by a society avowedly devoted to the application of the arts to the needs of industry. Last year was held in Paris an exhibition in which the applications of science to industry were admirably shown; this year it is the industrial value of the arts which is more prominently put forward. The directors cannot be too warmly complimented on the success of their efforts; it is rarely that an exhibition is marked so plainly with the stamp of unity, and though "the free exhibition," as the class to which have been admitted a variety of the various attractive objects which seem in Paris the necessary complement to every public show, may to some extent be over large, the

general effect of the Palais de l'Industrie exhibition is very "metallic."

Paris can certainly boast of an unusually large number of men who must be termed, for want of a better word, artistic iron and metal workers; and their emulative efforts, though they may strikingly seem to lead in the same direction, show plainly the effect of the endeavour to revive within the last few years the spirit that animated the sturdy work of the past. It is true this effort is strongly influenced by the taste of the eighteenth century, which in France has prevailed for some years, as it promises yet to continue to do.

In the artistic products of the Paris metal-workers,—we are speaking more particularly of the wrought-iron-workers,—the seventeenth and eighteenth centuries chiefly supply the models, and certainly very attractive are the results of this adaptation of the work of the past to the needs of the present. Each exhibition seems to show us that it is hopeless to ask for so-called original design. The discoveries of the scientific man of one age render useless those of his predecessors, but the creations of the artist never make us forget the creations of those who have gone before. The cry, then, that we do but repeat the work of the past finds some excuse in this theory, apparently comfortably accepted by a large number of artistic workers in the present day, and whose productions are satisfactorily represented, in, as regards France, the present Exhibition in the Champs Elysées.

Purists will doubtless shudder at the finely-wrought scrolls and foliage which decorate the iron railings, the tripods, and the chandeliers exhibited, as the sad emblems of a period when art was in its decadence; it is unfortunately true that the Middle Ages, that period when unquestionably the noblest creations of the metal-workers' art were produced, can scarcely be traced as the suggestive source of study taken by the manufacturers. Though relegated to a dark corner, may be seen in one of the most attractive stalls a humble member of the gorgeous railings that surround the tomb of the Scaligers at Verona; it is from the so-believed more graceful creations of later centuries that the designers have drawn their inspirations, and this being a French Exhibition it is the taste of the eighteenth century,—that typically French age,—which is most conspicuous. Had we been in Germany we should doubtless have seen more than one specimen inspired by the work of the Renaissance and the Middle Ages, when in the hands of the humble artist the plastic iron was forged and welded into work that rivals the delicacy of the goldsmith's productions.

The whole metal industry is well represented in this exhibition, from the rough ore to the finished production of the united labour of designer and workman, whose models, drawings, and working-studies are also to be seen here; a large share is naturally devoted to the bronze trade, so important a branch of the metal-worker's art in Paris, which has long been the head-quarters of the manufacture of all the wretched "ironmongery," as it has not too charitably been termed by a French critic, and so long abhorred by all people of taste, that has bedecked for three generations and more the mantel-pieces of households in every part of the civilised world. While this deplorable branch of industry seems still to be in a vigorous state of health, it is satisfactory to feel that its products find the market growing smaller and smaller every day in those countries where art education has been extended, but it still remains to the thoughtful observer a mystery, what outlet the manufacturers find for all this glittering rubbish; and yet only its more respectable productions are here exhibited. The cast gilt-zinc clocks that crowd the showy watchmakers' shops in the more popular neighbourhoods of Paris and the numerous provincial towns, show sufficiently how large a sale there is for a cheaper object than the expensive "*objet de luxe*," as it is pomposuly termed by the polite shopman or the elegantly-printed card of the firms whose products figure under the glass roof of the Palais de l'Industrie.

The gold and silver smith are largely represented, and all the well-known names are to be found; the jewellers are also well represented; the diamond-polishing forms, as it did in 1878, a never-failing source of attraction.

The usefully decorative services of metal are well shown by numerous exhibits of ornaments, cast or *repoussés*, for architectural decorative purposes, and certainly it must be tempting to the professional eye to see a whole Jarret or Mansard window, with its mouldings, its pediment and its details, well studied, an architectural model, in fact, all ready-made for use; weathercocks, finials, and many other decorative objects, are to be found here, and when their use is known, great aid do they afford to the architect. But perhaps the most characteristic feature of the whole show, and one remarkable when we consider that it is devoted to the display of metal-work, is the absence of all noisy machinery, a feature admirably calculated to induce long hours being spent in the exhibition. What the pecuniary success of the show has already been, may be judged from the fact that on the Sunday following its opening, when all was still in disorder, no fewer than 8,000 visitors poured into the Palais de l'Industrie. The management may fairly expect an even larger crowd when the retrospective museum is thrown open, this additional feature promising to be very complete. Among numerous contributions from famous collections, the South Kensington Museum has, we learn, liberally lent a considerable number of their marvels of the metal-worker's art.

THE ROYAL SANITARY COMMISSION AND THE *BUILDER* ON DUBLIN.

IN our notice recently of the Royal Sanitary Commission we almost allowed the report to speak for itself, and we summed up by giving the more important conclusions of the Commissioners. The "Sanitary Condition of Dublin" is a heading of old standing in the *Builder*, as a reference to our volumes for the last twenty years will show. Some journals have been of late taking credit for having pointed out such and such wants and such and such blots in respect to Dublin, whilst quietly ignoring or altogether ignorant of the fact that all the ins-and-outs of the unsanitary condition of the Irish capital were fully treated of long years ago in these pages. Indeed, we might say, without fear of contradiction, upwards of a decade since we anticipated almost every one of the conclusions of the Commissioners, in substance, if not exactly in the same words. Coming down to more recent dates we would particularly direct the attention of our old readers to the series of articles which appeared in the *Builder*, running through nearly every year between 1869 and the present year. The condition of the Liffey and its tributaries, the Poddle, the Dodder, the Jolka, and the other reeking though minor streams, was described. The homes of the people in the tenement houses, and the circumstances of these houses when private mansions and when they had degenerated into rookeries for several separate families, were depicted over and over again. The state of the old markets, meat and vegetable, the old sewers and their construction, the bad house-drainage and its complete absence in several districts, the scavenging under the old contract system, and when taken over by the Corporation, the back streets and the back yards rarely cleaned, unpaved streets, and bad road metalling, the drinking habits of the lower orders, the want of building bye-laws and improved dwellings for the working classes,—these and kindred other matters were fully pointed out by us and the ground again and again travelled over. Respecting that often-debated subject, the purification of the Liffey, and the need of an efficient system of main drainage, a scheme suited to the financial circumstances of the City, we long since advocated the amended scheme which is now about being adopted after a wanton expenditure of money and an utter failure to force an ill-advised and enormously expensive scheme upon the citizens.

In 1870, but not for the first time, we wrote: "Putting aside other plans, we boldly say there is no salvation for Dublin but in a thorough system of parallel main drainage and intercepting sewers on both sides of the Liffey. Until the river is saved from city sewage pollution on its north and south banks, there can be no proper purification of the Liffey. The treatment of the sewage in its final distribution is another question for which more than one method can be adopted, as it pleases those whose chief business it will be to carry it out with profit and advantage to the city and country at large. The Poddle river, rushing ever and emptying hourly its avalanches of solid slime into the Liffey, in the most central part of the city, is a frightful picture to contemplate. What it was a quarter of a century since, a mother of dead dogs, night soil, and butcher-shamble's offal, it is still, but multiplied in beastly enormity. Is it possible that the corporate authorities of Dublin can pretend to be ignorant of this frightful stream of rolling filth that passes but a few yards off, under their very noses, while sitting in their town councils? The effluvium of the Poddle wriggles itself through the street sewers, and the malaria of the Liffey is daily wafted into Parliament-street to the City-hall, acting as a due monitor and avenger of corporate negligence and imbecility!"

The Corporation have done a little service in the way of public improvements, but the state of the Liffey is still the same foul blot, the tenement houses are growing worse, the majority of the back streets are brimful of dirt, back yards are an abomination, and proper privy accommodation in the same quarters is absent. We pointed out in 1870, as previously and since, that there were districts north and south of the city that never witnessed a scavenger's cart in their neighbourhood, and that the watering-cart was only reserved for fashionable localities. The picture is still true. Long before the rebuilding of Essex and Carlisle Bridges, we suggested their remodelling to meet the greatly increasing passenger and vehicular traffic between the north and south of the Liffey, and the provision of a new bridge further down the river was advocated at the same time to meet the necessities of the growing northern district. Well, the two former bridges have been rebuilt, and a new swivel bridge was opened last year, built on the site we indicated. Ever since the water supply of Dublin was taken from the Vartry, we admitted that it was fairly good, but we repeatedly said that the poor often suffered from the want of a continuous supply in the poorer districts, and that the receptacles for holding the water in most of the tenement houses were out of repair or in a foul state. In our articles on the sanitary state of Dublin during the last twelve or fifteen years it will be found that we have discussed most of the points bearing upon the question of public or of personal health. Baths and washhouses, ship nuisances in the river, ambulance, and hospital accommodation, the floating hospital in the river or harbour, swimming-baths in the city, and along the sea-shore in the northern and southern marine townships, the state of the old city graveyards still unimproved, the free opening of the public squares, the inspection and disinfection of houses and cabs in times of epidemic, these were some in addition to the other matters already alluded to that we have discussed in our several articles on the sanitary state of Dublin from time to time, and, as we said, extending over several years. The very picture we drew in 1870 and 1871 of the haunts of wretchedness in certain districts north and south of the Liffey, of vice brought on by dirt, and disease and crime by drink, with punishment or death as the outcome, have been on two occasions lately reproduced in other words by the Recorder of Dublin, who directly traces the evils to their true source, the unsanitary condition of the homes and surroundings of the poor and working classes. The Borough Engineer of Dublin traces more evils to the defective condition of the house-drains and the state of the tenement houses than to any other causes, and he is not inclined to admit (indeed he never was) that the main sewers of the city are in a bad condition. Certainly for the last quarter of a century a good amount of new main sewer work has been executed to meet the growing extension of the city; but in the older portions of the city, and between the older and the newer portions, the sewers are as we have several years ago described them, "a patch work system," thus anticipating, as in other matters, the conclusions of the Commissioners.

We witnessed the execution of not a little of this patchwork north and south of Dublin, and the work as a patch was good enough in its way, but the work as a whole, old and new, could never be expected to hang together. The sewers are, to a large extent, irregular in line and gradient, and defective in sundry other ways, and a patch-work they must always remain, until the old work drops away from the new, or new work replaces the old all along the line. Several years ago we wrote,—"The drains connected with the old houses of Dublin lead nowhere, or are choked up; and the house drainage of some of the modern cheap buildings on the skirts of the city is a mere make-believe."

During the fifteen years between 1865 and

1880 we have had occasion at times to say some cheering words about many matters in Dublin and elsewhere throughout the provinces, because it has been our duty to chronicle progress and improvement as well as to point out the obstacles to it and to aid in their removal. The unsanitary state of Dublin has, however, supplied us much material for pleasant thought, notwithstanding the somewhat saddening nature of the subject. To have paved the way to a reform by persistently and consistently advocating the one line of policy in the interest of the few and the many alike,—health and home, and health at home and without, was to preach saving principles which must be recognised on the banks of the Liffey as well as on the Thames, and, indeed, everywhere amongst civilised people. There is a sad want of healthful dwellings for the working classes in Dublin, and a number of these erected by a public company, and which were visited for us some months ago, are deficient in accommodation, lack proper space and appliances, and in most instances we think the rents are too high for the class of persons they were intended for, but which in many cases inhabits them not.

In conclusion, we may say in respect to the main drainage of Dublin the Corporation some days ago resolved to refer the matter to the Main Drainage Committee, with a view to agreeing upon some plan of action for carrying out the recommendations contained in the report of the Commissioners. Procrastination, however, in municipal circles in Dublin is proverbial, and the exercise of a respected public criticism is still necessary to force action and ensure anything approaching towards expedition, even in a life and death question.

The *Builder* collected its own evidence, and its many articles were the result of visits and personal inspection. Yet the outcome of a Royal Commission sitting for many days scarcely carries the subject of the sanitary condition of Dublin further, and in all its essential features it is identical with the conclusion and recommendations long since expressed in this journal.

METROPOLITAN RAILWAY TRAFFIC.

MUCH as is the position of the heart to the body is that of the metropolis to Great Britain; and of nothing is this truer than in regard to railway traffic. If a map of the railways of the country be taken it will be seen that the lines that represent the railways grow blacker and thicker and more numerous as London is neared, and that there is a convergence of lines thereto. But these do not all enter the heart of the city, and hence the idea of a railway which would traverse the most populous part, and also join the great stations where railways ceased, was one which could not be otherwise than acceptable. The passenger who was put down at Paddington, for instance, and wished to travel from King's-cross, had the mild horrors of a middle passage,—long, comparatively costly, and inconvenient often,—to endure. But when the underground railway was commenced it not only gave a quick and cheap means of transport between parts of the great city, but it became also a means of junction between some of its great railways. The public need it met is known to have been great, but not many know the extent of that need, or the manner in which it has been met. Nor is the vastness either of the amount that has been spent in providing the great lines that traverse the metropolis, nor the largeness of the passenger traffic thereon known. It may, therefore, be of interest at this juncture, when another extension of the Metropolitan line has been so recently opened, to give from official sources statistics which show the cost of what has been done, and the extent to which the public avail themselves of the facilities for travel on the chief of the lines that now specially and almost solely serve the metropolis.

In round numbers, nine millions sterling have been spent in forming the Metropolitan Railway, in fitting up with appliances for travel, and in subsidiary works in connexion with the great line that traverses London. With the exception of about a quarter of a million,—expended in providing the working stock of the line, and of one or two smaller sums subscribed to other related London railway companies,—the whole of this vast sum has been spent in purchasing land and buildings, in adapting these for the purposes needed, in forming the line, the works, and the stations, and in the needful expenditure in other methods to create the line. That working stock to which reference has been made is small beside that of the great companies; but it is probable that few of the latter find their passenger accommodation so much used. There are not 300 engines, wagons, and carriages on the Metropolitan; but we shall soon see how large is the volume of passenger traffic that travels over the line. Before leaving the question of cost, however, it is needful to state that the Metropolitan Railway holds a quantity of surplus lands and buildings,—so large that it has a net revenue therefrom of over 1,000*l.* a week, and that the amount of this revenue is increasing, though sales of land from time to time keep that increased rental in check. Coming to the most interesting part of the official statement from which some of these facts are drawn, we have a summary of the gross receipts of the Metropolitan Railway for traffic, and of the numbers of passengers it has carried for over eighteen years. From the financial statement it appears that in the year 1863 the gross traffic receipts of the Metropolitan were 101,707*l.*; whilst in the last complete year they were 506,204,—or, in other words, the receipts are now full five times what they were at the opening of the line. It will be interesting to give fully a statement of the number of passengers over the railway in every one of those years. That statement shows that the numbers were as under for each year:—

Year.			Passengers.
In 1863	there were	carried	9,455,175
,, 1864	,,	,,	11,721,889
,, 1865	,,	,,	15,763,907
,, 1866	,,	,,	21,273,104
,, 1867	,,	,,	23,405,283
,, 1868	,,	,,	27,708,011
,, 1869	,,	,,	36,893,791
,, 1870	,,	,,	39,160,849
,, 1871	,,	,,	42,765,427
,, 1872	,,	,,	44,392,440
,, 1873	,,	,,	43,533,973
,, 1874	,,	,,	44,118,225
,, 1875	,,	,,	48,302,324
,, 1876	,,	,,	52,586,395
,, 1877	,,	,,	56,175,753
,, 1878	,,	,,	58,807,038
,, 1879	,,	,,	60,747,553
,, 1880 (first half)		,,	31,592,429

This growth of passenger traffic on one small line of some dozen miles is wonderful in its rapidity. It will be seen that at the opening the number of passengers was large,—nearly one million per month; but since then there has been such steady progress that at the present time over five millions of passengers are carried monthly over the little Metropolitan line. During the first half of the present year not less than 174,543 persons were carried daily, on the average, over that line, so that every hour of the twenty-four not less than 7,000 persons were carried; or, to put the figures in another way, the stream of traffic was so great that the number carried on the Metropolitan Railway during the first six months of this year was equal to the estimated population of Great Britain and Ireland! And it is evident that the maximum traffic is not yet reached, for at the date to which we have referred there had been expended on lines not opened at the end of June last fully 624,000*l.* One of the lines,—that from Finchley-road to Harrow, has since been opened, and a new source of traffic has consequently been tapped, Other extensions are in progress, and will, in time to come, add to the traffic of the Metropolitan; and though it may be postponed, yet the Inner Circle Railway must some day be completed, and a large volume of traffic now blocked off will flow over the underground line. It has already been stated that the numbers given are those of passengers on the Metropolitan Railway, and that over a series of years the allied line (but not yet connected by that inner circle), the Metropolitan District, has carried half as many. It is clear, then, that the possibilities of passenger traffic in the metropolis are almost illimitable; and it is evident that there is a great future before the railways which practically monopolise that vast traffic. The oldest of these,—the Metropolitan,—has already become a very profitable company to its shareholders; and it is fair to add that its service to the public has been immense. It is clear from the history of the past that its passenger traffic will grow; and it is evident that it can, from the experience of "busy days," almost double the number it carries, without largely adding either to its staff or its working stock, so that it is evident that as branches long in completion are opened out, the volume of passenger traffic on the great Metropolitan Railway will continue to grow.

V.C.—HONOUR FOR SAVING LIFE.

THE decoration of the Iron Cross, the possession of which is indicated by the addition of the letters V.C. to the name, is rightly prized by the English soldier as the highest distinction that he can hope to attain. That decoration, indeed, vouches for the display of the two sister, though sometimes separated, virtues of courage and mercy. It is conferred for the saving of life under the fire of the enemy.

Somewhat allied in its character to the Victoria Cross, though bestowed by less exalted judges, is the medal of the Royal Humane Society. It is a distinction of which it would be desirable to enhance the value, by exalting the dignity of the awarder of the decoration. The idea that underlies the two badges of honour is the same; and it is one that is eminently germane to the English character.

We want a third step in this noble brotherhood. We want an honour for those who save life, or perhaps many lives, at the risk of their own—by promptitude and energy, though neither under the fire of the enemy, nor in the dangers of sea or river. Not a few instances may be recalled of heroic and devoted courage in the mine, or the railway, even in the crowded street. It is possible that the guard who, on the 19th of August, ran along the line of rails in the Bleamoor Tunnel to attach fog-signals to the way, and thus to give the only possible warning of danger to the engineer of the Pullman express rushing to his own destruction and that of a whole trainful of passengers, did not consciously risk his life in so doing. But when we remember the fate, within a few days of the same event, of an experienced railway official killed in crossing the line at a station, we must admit that the action referred to was not unattended with danger. And beyond all doubt it showed promptitude, presence of mind, perception of the best thing to do in a sudden and grave emergency, and its result was the avoidance of a catastrophe more terrible than any that has occurred in the United Kingdom, save the fall of the Tay Bridge. Demands of this nature, in prompt courage and ready thought, are of daily occurrence on our railways. Why should not a due token of commendation be added to our social encouragements for noble conduct? If a man has the virtue to become rich, testimonials are there to greet him. How if he only save the lives of fifty or a hundred people?

HAY AND CORN DRYING MACHINE.

THE weather has varied so much in the different parts of the island that it is difficult to form a reliable estimate of the prospects of the harvest. Abundance is promised by many of the fields that we have seen, while bad accounts come from other districts. The same may be said as to the hay. Everywhere late, in some districts there has been a fair, if not a heavy crop; while in some there has been little but a contribution to the dunghill.

In no respect is man a greater debtor to Science than when she presents him with the means of increasing or preserving the yield of the precious fruits of the earth. Nor has Science been behindhand, of late years, with the demand made on the genius of her votaries. The very misfortune of labour-contests has not been without some countervailing advantage, in the way in which it has turned the attention of mechanists to the production of labour-saving machines. In our actual state it may be said that these implements are characterised by utility rather than by elegance. By that we do not mean artistic elegance, but that true beauty of scientific construction in which the aim sought is attained with the greatest economy of material consistent with durability. As it is, advancing without beat of drum, the hay-cutting and hay-making machines seem to have arrested, at all events in many parts of England, the once usual annual invasion of Irish labourers.

Hay-making, however, proverbially requires sunshine. The same is true to a much more limited extent, of hay-cutting. But in the present year we have very often witnessed the mowing, by machine or by hand, of a fine grass crop, under the encouragement of a bright day or two, succeeded by a steady downpour on the prostrate grass. It is in cases like this that the farmer will listen, with all his ears, to the promises of Mr. W. A. Gibbs, of Gilswell-park, Chingford, Essex. Nor are these simply

promises—or ideas set in cursory order on paper alone. Mr. Gibbs has not only invented, but also constructed, a hay-making apparatus, of which actual experience has been made by Mr. G. P. Fuller, of Neston Park, near Corsham, Wiltshire, quite recently. The apparatus is in two parts. It comprises a frame upon wheels, supporting a sheet-iron reciprocating trough, along which the hay is slowly passed, subjected to a powerful current of heated air, and turned about by rows of revolving forks. A second apparatus, also on wheels, contains a furnace for heating the blast, and a fan for producing it. A portable steam-engine forms a third portion of the contrivance; but this is already to be found on many farms.

The effect of this machine is thoroughly to dry grass that would otherwise have been entirely spoiled. It does this at the rate of four one-horse cart-loads per hour, in other words, it saves the hay of an acre in an hour. At Neston-park 117 acres were cut. The crop was light. By the use of the Gibbs machine the whole 117 acres were cleared in three weeks, two of which were continuously wet. Details are given of the cost of the cutting and clearing of 43 acres in one week. The crop was very light, only 30 tons being made from the 43 acres. The cost amounted to 9s. 6d. per acre, or 13s. 6d. per ton. The machine was actually at work for only twenty-four hours during this time, so that it made about 1¼ ton of hay per hour. The hay is said to be as fragrant as that made by the ordinary process.

Our readers will remember the interest with which we have always regarded every fresh appliance which engineering has offered to agriculture, and that we urged the possibility of saving the hay crop by artificial means long before Mr. Gibbs's invention was made. The saving of labour, or value of the cost of labour, by the substitution of mechanical for human or for animal power, is as legitimate an object for the farmer as it is for the cotton-spinner, nor do we see any reason why the economy should not be as great in the one case as in the other. But it is not only cost that is saved. The great advantage of mechanical power, as compared with animal power, is the rapidity with which it can be developed and applied in such cases as cotton-spinning; this rapidity only means saving of time, and thus saving on the interest of money invested in the business. But in agriculture it means much more. It means such a command of time as renders the farmer to some extent independent of the caprices of the season. Now another step is proposed. It is one which, sooner or later, we hold to be certain of accomplishment. It is to make the agriculturist, to a great extent, independent of the weather. The possession of a hay-drying machine, if it be one that actually does all that it is said to do, will be to the farmer equivalent to the earnings of the hay crop. As we have usually one day wet to one fine, and as July is one of the wettest months of the year, this ought to be equal to a saving of at least 25 per cent. of the annual hay crop, or to the reduction, whoever pockets the benefit, of a fourth in the cost of hay.

But this is but little in comparison to what may be effected as to corn. We do not suppose that any corn-drying machine would be of use in those cases where the corn damps in growing and mildews instead of ripening. But we are under the apprehension that the great loss that the farmer experiences in his cereals is not of this nature, but is due to the deterioration or partial germination of the grain after it has ripened in the ear, and while the solstitial rains, perhaps rather later than usual, keep the reaper from the field. We can see no reason why artificial harvesting should not, in these cases, be successfully adopted. And we invite those who have saved their hay by hot blast to have the courage of their experience, and to try a corn-saving machine.

Electric Lighting at Liverpool-street Terminus.—So satisfied are the Great Eastern Railway Company with the electric light at their Liverpool-street Terminus, that they have increased the number of lamps from 16 to 31. Three of the new lamps are outside the station. The system is also extended into the booking-offices, and instead of being confined, as heretofore, to the main platform, has been carried to the suburban platform also. The variety of light in use here is that known as the "Brush" system.

THE MERCERS' COMPANY'S NEW BUILDING IN CHEAPSIDE.

THE new building for the Mercers' Company consists of a lofty pile, 200 ft. long, with returns in Ironmonger-lane and Old Jewry. It is faced with Portland stone and polished granite, with statuary and carving, and has a lofty tower over the entrance to the hall. It was designed by Mr. Barnes Williams, the Company's architect, so as to harmonise with the old entrance to the hall,* which has been literally reproduced.

The parts of the building east and west of the entrance are devoted to commercial purposes, and are principally let to former tenants of the company. The remainder forms the entrance, vestibule, staircase, and suite of rooms for the use of the Company.

This building completes the line of frontage which has been formed by setting back the houses on the north side of the Poultry.

Messrs. Ashby & Horner are the contractors. Mr. Fenning supplied the granite. Messrs. Rounson & Drew supplied the constructional ironwork; Mr. Shrivell the ornamental ironwork. Messrs. Holden & Co. furnished the ornamental zincwork. Mr. S. Trickett supplied the stone. The carving was executed by Mr. Sansom. Messrs. Benham & Co. are fitting up the kitchens, the hot-water apparatus, and the gas-work. Mr. Julius Sax fits up the electric bells; Mr. Crace has the contract for the decoration. Mr. James Wilkinson has acted as clerk of the works. Mr. Hyatt has supplied all the pavement and stallboard lights.

A KINDLY WORKMAN.

IN one of the antiquated towns of Emilia, only a few miles from Bologna, on the romantic road to Ravenna, so long the capital of Italy, was celebrated not long since a simple yet characteristic ceremony, which roused from the dead slumber of bygone magnificence the quiet, town of Castel San Pietro, sleeping under the now useless protection of its Middle Age castle, and almost in the shadow of the towering Apennines. An honest carrier of the Castel San Pietro has bequeathed to the Working Man's Society of his town the small savings of a life-time, to give a little marriage-portion to a poor girl every two years. The Senator Pepoli, president of the working man's society of Castel San Pietro, has wisely addressed to all the similar societies throughout Italy a circular stating the circumstances of the generous gift of the worthy Francisco Fabbri, whose example and memory merit even wider notice than such a step will assure his philanthropic action. From his boyhood a carrier, Fabbri toiling honestly and laboriously, commenced to set aside his savings that were to assure him in his old age a happy existence in the bosom of his family. But even in his youth—we quote from the Senator Pepoli's circular—in his leisure hours, or when the fogs and wind prevented him exercising his business, he betook himself to the well-peopled slopes of the Apennines, gladdening with the sound of fiddle the joyous meetings of the country-folk, and never ashamed to gather from his work its ill-paid gains. The sums thus amassed and jealously set aside were never expended on himself. He used to tell his friends and relations that he had in view a secret object, which he would in due time make known. The day has at last come, and the honest old fellow has kept his word. During last Easter he came, accompanied by a notary, to the rooms of the working man's society of his town and declared, —so states the Senator Pepoli,—that he presented to the Association seven hundred *lire* (about 30*l*.), scraped together by him little by little, with the intention that two hundred *lire* should go to augment the loan fund, and five hundred *lire* to serve to form a capital which, at five per cent., would enable the sum of fifty *lire* to be given every two years to the daughter —chosen by lots—of one of the members of the Association. Astonished at such a bequest, I asked, continues Senator Pepoli, whether such was in reality his fixed desire. Fabbri's reply, in its curt simplicity, is a model of eloquence:—"This has been the dream of my life. To have the pleasure of being useful to my fellows I have worked incessantly, and now I have attained my object, and I am happier than a Cæsar."

When a wealthy person, either during his lifetime or on his death-bed, presents to the poor of his native town a sum of money to alleviate their suffering there rises throughout the country a cry of gratitude, and the example is in everybody's mouth. It seems to me, remarks Senator Pepoli, that the fact I have related contains the sublimest expression of human charity, and that this honest and aged benefactor deserves the gratitude of the nation and of the Government. It is a noble example which it is to be hoped will find emulative imitators, as it visibly raises the moral level of the workman in the face of the incredulity and selfishness of his eternal detractors, and this example merits to be inserted in the transactions of all the working men's associations throughout the country.

As a further and even more lasting token of Fabbri's generous donation an inscription has been placed on the house in which he was born, "Here Francesco Fabbri, a workman, gave on the 29th of March, 1880, the economies of a long and honest life to the working man's society of Castel San Pietro to afford a marriage-portion to a poor young girl,—the public sentiment hopes that from the marriages thus made may spring citizens, laborious, upright, and provident like their pious benefactor."

* The old entrance to the hall it is asserted was designed by an Italian architect in the seventeenth century. If there be any old pupil left of the Company's late architect, Mr. George Smith, we should like to hear what he has to say on this subject.

BUILDING NOTES FROM SOUTH AFRICA.

As South Africa is a quarter of the empire that was seldom spoken of before the era of the Zulu war, and is even yet a *terra incognita* to the trade, the readers of the *Builder* will doubtless appreciate a few miscellaneous notes from these colonies. During the past eight or ten years times have been generally prosperous throughout the South African colonies, notwithstanding the native wars that have occurred. Comparatively vast strides have naturally followed this prosperity in the nature and character of the building operations throughout the country. The oldest and most venerable buildings to be found in South Africa are of Dutch architecture, and their style has left a certain impress on the buildings of even the present day in most of the larger towns of the Cape colony. Dutch buildings are, however, more exclusively the peculiarity of Cape Town. The tiny-paned, wide-sashed windows, almost flush with the walls, the handsome and curious fanlights, the gracefully-outlined gable, and the high walled-in "staep," occupying the whole of the space where the side-walk would be in an English street, are features which strike the eye of every stranger on landing from Table Bay. Solid board shutters folding inside the window, and walls a couple of feet thick in solid masonry, give evidence of good judgment as to the requirements of the climate; for the days are warm (seldom above 100°, however, at Cape Town) and the summer dusty in the town. Here and there may be seen a building partaking of the East Indian style, and showing evidence of the settlement here of more than one Indian officer. Nearly all of the public buildings here were built by the Dutch. The new central railway station, a handsome and well-planned structure, finished in 1879, marks the new era of English-designed buildings, and throughout the town the old "staeps" are giving way gradually to side-walks and English shop-fronts. The new Parliament Houses of Cape Town, designed, no doubt, to hold the members of the confederate Parliament of the future, have again been commenced, a number of workmen being now engaged on the foundations. This building, which in external appearance more resembles the Capitol at Washington than the British Houses of Parliament, will prove to be a great ornament to the town. It is situated just below the present Government House (the private and official residence of the Cape Governors), and just at the entrance to the Avenue and Botanic Gardens, where its prominence may add to its attraction as a "feature" of the town. Its cost is estimated at 120,000*l*.

In Cape Town and the principal towns of the western province of the Cape the bulk of builders' work is carried on by the Malays, who have constituted the mechanical class of the population for the past hundred years in those districts. Although quiet, sober, intelligent, and industrious, compared with the native classes, and even compared with Europeans, the

Malay lacks that faculty of steady application, the spirit of genius, which can be displayed by the Englishman or the American, and consequently the European mechanic steps in as foreman or overseer, and takes the place of preference, particularly in all jobs or work requiring more than the average skill. In the eastern parts of the Cape, in Natal, the Free States, and Diamond Fields, and the Transvaal, the Malay and native (negro) mechanic may be found, but they are not so numerous or so skilful as the low average of the English mechanic.

We may as well here speak of the prospects of mechanics who may desire to emigrate to these parts. They are in great demand in nearly all parts of South Africa, and for the past several years no class has thriven better, all things considered, than they, compared with the same classes in other colonies. But in a population of about a million whites it must be distinctly understood that this demand has somewhat narrow limits, and will not apply to all classes of mechanics. For instance, a carpenter, a mason, or bricklayer, who had only worked in one branch of his trade, might find it most difficult to get a living unless he could in some way "pick up" the other branches and perform general work. The population being sparse in most parts, and the towns and villages small, the mechanic is called upon to do, in small jobs, the variety of work represented by a large shop in England. It is not expected, however, that the general work of such will be equal in quality to that turned out by the English establishment. What is known as the "handy man" will succeed the best in South Africa; a man who can make a box or chest, solder a kettle, or repair an umbrella. In this, as more or less in other colonies, the trade of mason is generally found united to that of bricklayer and plasterer, and a man who can combine a knowledge of these three trades is almost certain to do well. Wages vary from 1*l.* 10*s.* to 3*l.* per week, but so many differing circumstances of climate, land, situation, and price of living, have to be taken into account, that we must refrain from attempting any specific information on that subject. Such information can be best obtained through the Cape Emigration Office in London.

As to the style of building, it is only recently that the era of three and four story buildings has dawned. The Dutch built nearly all their houses of a single story, and it was only in 1878, we believe, that the first four-story structure was erected in Cape Town. Here the houses, both stories and dwellings, are built in brick and stucco, and the roofs are flat and plastered, a depression on one side carrying off the water. In most of the inland towns, such as Grahamstown, King Williamstown, and Maritzburg, Natal, brick buildings prevail. Within a few years past several experiments have been made in the importation of wooden buildings from England and America, ready-made, and only requiring to be fitted up. A church at Kimberley and one at East London have been erected in this way, and it is believed that cottages may be imported very cheaply in the same way. These experiments are, of course, partially a result of the scarcity of mechanical labour. In some districts stone is largely used, though none of the quality of the sandstone of England will be found. A kind of hardy, slaty rock is to be found, but granite abounds in most parts of the country. This is a very hard, light-grey granite, very durable, and capable of taking an excellent polish, but it is difficult of working on account of its extreme hardness In Table Valley (at Cape Town) and at the Paarl, extensive quarries are now in operation. At the latter place there is a large mountain of solid granite, sufficient to supply the world as far as quantity is concerned. The quarries here are chiefly used to supply the dock-works of Table Bay. Although possessed of some remarkably fine forests, South Africa is a treeless country, and, of course, native woods do not enter largely into the builder's materials except for shop purposes, such as cabinet and wagon making. Considerable quantities of pine and deal are, therefore, imported from Norway, Sweden, and latterly from Canada; but the English mechanic will have to get accustomed there to the use of the native woods. Although the larger forests of the Cape, Natal, and the Transvaal have not been thoroughly worked, owing to the difficulties of transport, yet several varieties of South African woods are obtaining celebrity. A common wood there is the yellow wood,—a light-coloured wood, heavier than deal, and of finer, closer grain, and considerably harder to work. This wood comes in for much of the cabinet and furniture work of the colony, and is very durable. The "sneezewood" is another beautiful and fine-grained wood, very hard, and likewise used much in furniture and wagon making. For this purpose it is invaluable, as it will withstand the heat of the driest inland districts, where an article made from imported wood will warp and shrink up, and often literally fall to pieces. This excellent quality pertains to most of the other woods of the Cape. But perhaps the most valuable of all the native woods here is the "stinkwood," so called from a peculiar but not disagreeable odour emitted by it when freshly cut. This wood is generally as dark as mahogany (it is, in fact, called the Cape mahogany), but is more variegated in shade; it is of the most compact texture and finest grain. One of its eminent qualities,—which has never yet been properly taken into account by woodworkers,—is its susceptibility of polish. When properly polished, it can be made to assume more the appearance of some kind of metal than wood, and figures to excellent advantage in carving. Specimens of carving in this wood may be seen in the Dutch Reformed Church, Adderley-street, and in the Lutheran Church, Strand-street, Cape Town, and are well worth a visit by the traveller in South Africa. They not only show the excellence of the wood, but the taste of the Dutch sculptors, which is not to be despised. A wood which is no doubt destined to figure prominently in marine architecture in the future is the mangrove. This wood, as is known, possesses the rare property of resisting the effects of seawater, but though found on the American coasts and in some other parts, has never been got in pieces of sufficient length and straightness to be utilised as piles and dock timbers. The discoveries recently made by Mr. St. Vincent Erskine along the Zanzibar coast and at the mouth of the Congo have revealed forests of magnificent timber fitted in all respects for dock works. These trees, especially at the mouth of the Congo, grow 2 ft. in thickness, and many of them 100 ft. high. Standing in the water, where they grow naturally, their appearance is very striking to the traveller. The mangrove from these places has been tested with the most satisfactory results, and, once they are brought to the attention of marine engineers and harbour builders, will, without doubt, play an important part in future harbour construction.

THE BRITISH ASSOCIATION AT SWANSEA.

THIS year's meeting of the British Association for the Advancement of Science commenced in Swansea on the 25th ult. Thirty-two years ago the Association met in Swansea. The present year's meeting has not been very largely attended, but has been signalised by the very able and interesting address by the president, Professor Ramsay, F.R.S., Director-general of the Geological Survey, which dealt with the subject of the recurrence of certain phenomena in geological time.

On Thursday, the 26th inst., in Section B., Chemical Science, Mr. H. B. Dixon, M.A., read the paper by Dr. J. Pattinson, containing the report of the committee on the best means for the development of light from coal-gas of different qualities. The paper gave information regarding the burning of what is known as common gas, or gas made from the common bituminous coal of the Newcastle and other coalfields, or from this class of coal mixed with a small quantity of cannel coal, and having an illuminating power equal to sixteen standard sperm candles when consumed at the rate of 5 cubic feet per hour in Sugg's No. 1 London argand burner, —the standard burner adopted in London by the London gas referees, and prescribed in nearly all Acts of Parliament of gas companies. After observing that the principal condition to be observed in order to develop the maximum amount of light from coal-gas was to supply the flame in a suitable manner with just a sufficient amount of air to effect the complete combustion of gas, Mr. Pattinson gave the results of experiment with union jet burners. In the case of each burner there was a certain consumption and a certain pressure, and at all other consumptions or pressures above or below this the results were worse. There was, therefore, a limit to the reduction of pressure causing an increase of the illuminating power of the gas consumed, and this limit was reached when the flame ceased to have a somewhat definite form, and burned in a languid waving manner, showing very low intensity of combustion, and having a tendency to smoke.

In Section D, Biology, Dr. Gunther, in his address as President of the Section, spoke on the subject of museums and their management. With regard to the British or National Museum, he said he believed that some of the members of the British Association would feel somewhat disappointed that the zoological and botanical collections on the one hand, and the palæontological on the other, continue to be kept distinct.

In the Anthropological Department of Section D, Professor Rudler read a paper on "The Ethnical Relations of the Typical Man of South Wales." In the same department, several papers of interest were afterwards read, including one by Mr. B. Jones, of Llanelly, on "The Antiquities of Laucarum, or Loughor Castle." Mr. Jones pointed out that Loughor was originally a Roman station called Laucarum, and was situate on the "Via Julia," which ran from Gloucestershire into Pembrokeshire. The Romans had a castle on the east bank of this river, and a Hospicium on the west bank. The "Via Julia" passed from Neath through Penller-gaer, which was at one time a Roman camp. To the north of the Penller-gaer was a place called Tre-di-ar-y-gaer, or Tredegar. A Roman bridge crossed the river at Llanidlo Talybont, and there was a watercourse extending from the castle to Lliw Bridge, which could still be traced. The castle was supposed to be of British origin, and to have been utilised by the Romans.

In Section F, Economic Science and Statistics, Mr. James Heywood, F.R.S., presided, and Dr. J. H. Gladstone introduced a report of a committee on the "Importance of her Majesty's Inspectors of Schools being appointed with reference to their scientific attainments." In the discussion which followed, Mr. Wilkinson said a system prevailed in France which we as a nation would do well to adopt. There a boy got technical instruction and a knowledge of ordinary literature, and a general education, in fact, which was all that was required to make him when he left school competent to earn his own livelihood. Dr. Silvanus Thompson suggested that workshops should be attached to schools—that in all schools boys should be trained to acquire a knowledge of the principles that underlie the work they would probably have to do—that they should learn something of the laws of general science, chemistry, and physics, and physiology. Mr. Botly read a paper on "Agricultural Statistics and Land Tenure," in which he gave in a tabular form the acreage under various crops, with the annual increase or decrease on the year, the quantities and value of imports of cereals, cattle, sheep, and swine, and the number of horses used in agriculture. He showed the importance and necessity of some alteration in the land laws, so as to develop a greater outcome from the land by giving larger security to the occupier for increased investment of capital in the cultivation of the soil. The paper was supplemented by a table showing the number of agricultural holdings in the United Kingdom, with the number of cattle, sheep, and swine to the acre, and the rental in England, Scotland, and Ireland.

In the evening a *soirée* was given by the Mayor in a large building erected for the Eisteddfod, when about 3,000 persons were present.

Of the excursions, that on Thursday, to Dowlais Works, on the invitation of Mr. G. T. Clark, was one of the most important and interesting. Mr. and Mrs. Clark, and Mr. Menelaus, received the visitors, who, under the guidance of Mr. W. Menelaus, were conducted over the various departments of these famous iron and steel-making works. Subsequently the visitors were entertained by Mr. Clark at luncheon in the Guest Memorial Building.

On Friday, in Section A, Mathematics, Professor Everett read the report of a committee upon "Underground Temperature." Observations, it was stated, had been taken in the Tolergoch Lead Mine, Flintshire, between Rhyl and Presteign. The top of the shaft was 190 ft. above the level of the sea, and was at the foot of a hill 500 ft. above the sea. The lowest workings were 900 ft. below sea level. The veins ran across an angle of carboniferous lime-

stone, bounded on both sides by faults which threw down coal-measure shale for a considerable distance. The limestone dipped at angles varying from 45 deg. to 55 deg., and was of two kinds, one white and massive, the other thin, bedded, black, with thin shale partings. There were levels at intervals of about twenty yards vertically in the vein, most of which had been driven for some years. The observations had been taken by boring a hole 24 in. deep, at a distance of from 1½ to five yards from the forebreast, and, either on the same day or on the next day, inserting one of the committee's slow action thermometers, with a foot of plugging, consisting of dry rag and clay behind it. After an interval, generally of four days, the thermometer was taken out and read, then reinserted and read again about a week later, the difference between the two readings never amounting to so much as half a degree.

In the Chemical Science Section, Dr. Gilbert, the President of the Section, delivered his opening address, which took for its subject "The Application of Chemistry to Agriculture."

In Section C, Geology, Mr. Edward Wethered read a paper "On the Sandstones and Grits of the Lower and Middle Series of the Bristol Coalfield." In the course of his remarks he said:—The Bristol coalfield is noted for its series of grits and sandstones, and these probably have their equivalents in the South Wales and Forest of Dean coalfields, as well as in that of Somersetshire. The first point raised was the application of the term grit and sandstone. The author confirmed the statement of Mr. Sorby in his presidential address to the Geological Society in 1880, to the effect that the carboniferous sandstones were composed of angular grains. Of those examined by the author, the grains of the millstone grit were the least angular. It was also pointed out that, as rocks show such variation of coarseness in the same deposit, this could not be taken into consideration as a test for grit. It was therefore suggested that the term grit should be confined to those rocks which show regularity of grains, irrespective of coarseness; and the term sandstone to those which are composed of rounded grains (*i.e.*, from which the angularity has been removed). In any case, the term grit must be more generally applied to carboniferous rocks than has been the case hitherto. After a careful examination of the rocks of the coalfield, the author had come to the conclusion that, owing to the great similarity of carboniferous arenaceous rocks, occurring at different horizons, it was at the risk of serious error to rely upon them for correlation or stratigraphical landmarks. The proportion of silica could be sometimes used as a guide in determining one from another, but little reliance could be placed on it over a large area, as so many contained nearly about the same amount.

In the Section of Economic Science and Statistics, Mr. Stephen Bourne read a paper on the "Revival of Trade." In the course of his remarks, comparing 1878-9 with 1870-80, he said:—The increased export trade has been principally in iron and cotton goods, the one being 8·44*l.*, one-third of the whole increase of 27·00*l.*, and the other 7·30*l.*, or one-fourth. Iron has greatly risen in price, but cottons have slightly, woollens considerably, fallen. An analysis of the figures shows, in the first place, that great as has been the increase in our exportations, that of our import trade has been far greater, the excesses of one over the other being 27,000,000*l.* Secondly, that the revival has been much more to the advantage of those who have sold to us than to those who have sold our produce and manufactures. Thirdly, that the whole excess in the value of the exports is scarcely equivalent to the entire cost of the food we have imported or consumed. Bad harvests have forced us to buy from others, especially the United States of America, who thus, having profits to expend, and looking to permanent extension, have purchased our manufactures at depressed prices. Good harvests at home, especially, abroad as well, may reverse this.

Mr. James Abernethy, V.P. Inst. C.E., delivered his address as President of the Mechanical Science Section, his theme being the past and present condition of the Port of Swansea as typical of the rise and progress of the various ports in the Bristol Channel within the last half century, and the vast improvements which have been effected in the nature and extent of the accommodation provided to meet the requirements of the shipping of the present day as regards dock facilities and appliances for the rapid and economical loading and discharging of their cargoes. Having described the existing dock works, he said that in consequence of the great increase in the size and number of the shipping frequenting the port, particularly steam-vessels, it has been found indispensable to provide an entrance-lock of greater size and depth of water over the cill, with an additional extensive dock and spacious quays so as to furnish ample siding accommodation for the shipment of coal, and increased facilities generally for the loading and discharging of cargoes. In consequence, the trustees have entered into a contract for the construction of a dock in Fabian's Bay of 23½ acres area of water space, together with an entrance-lock 450 ft. in length, and 60 ft. in width, with 32 ft. of water over the outer cill at H. W. O. S. T.; the dock to be kept (as in the case of the South Dock) above the tide of the day by the surplus water from Port Tennant Canal and other sources discharging into it. As regards the shipment of coal, it is proposed to be conducted on the same system as that at the Alexandra Dock at Newport, viz., by gravitation from the sidings to the hoists both for the loaded and empty wagons, the whole machinery of the dock appliances to be worked by hydraulic power, it having been found possible by this system at a very moderate cost to ship from 150 to 200 tons of coal per hour at each hoist. In addition to providing this extensive dock accommodation, the embanking of the indent termed "Fabian's Bay," within the eastern pier, will it is anticipated, as in other well-known cases, tend to accelerate the tidal flow into the upper reaches of the river, and give a better direction and greater force to the ebbing tidal current for the future maintenance of the entrance channel at present in progress of being further deepened by dredging. These various works are now in course of construction, under Mr. Abernethy's superintendence.

A paper by Mr. J. M'Connochie, on the Bute Docks, Cardiff, was next read.

Saturday was chiefly devoted to excursions, St. David's Cathedral, Dynevor Castle and Park, Gower, and other places being visited. A great many of the members visited the new docks at Swansea, under the guidance of Mr. Abernethy.

On Monday, in the Mechanical Science Section, Mr. Baldwin Latham, C.E., read a paper on "The Temperature of Town Water Supplies," to which we shall return.

M. Ernest Denedict made a new suggestion as to a Channel tunnel to France. He gave an elaborate account of the engineering operations requisite for its construction, which would require an outlay of 6,000,000*l.*, probably increased to 8,000,000*l.* by the cost of apparatus, &c. That capital would require 500,000*l.* a year to pay 5 per cent., or 27 trains in each direction, at an average profit of 1*l.* per train mile; and that would be less than a third of the total number of trains that could be worked through the tube daily. The increased traffic on the connected railways on each side of the Channel would be great, and it would pay those railways to subscribe the capital required. That being the commercial aspect of the enterprise, it was desirable to remember that the undertaking would be of great national importance. There was not a country in the world except England which could turn out the materials within any reasonable period. It would stimulate trade during construction, and after its completion would result in a permanently increased development of traffic in many articles of commerce. The peculiarity of this scheme was that, instead of tunnelling through doubtful geological strata, which might have faults like those met with at the tunnel under the Severn near Bristol, it was proposed to carry across the Channel a tube 16 ft. in diameter, at 35 ft. below the lowest water level.—M. Bergeran, C.E., of France, said the plan was not worthy of serious examination. The plan now being carried out was simple in idea and easy of execution. It was simply a tunnel through a bed of chalk 160 ft. thick.

In the Section of Economic Science and Statistics, the report of the Anthropometric Committee was read by Mr. F. P. Fellowes. It stated that since their first appointment at the Bristol meeting in 1875, they had had the advantage of being presided over by Dr. Farr, who had always taken deep interest in their labours, and had placed at their service his unrivalled experience in the collection and arrangement of statistics. Dr. Farr, they regretted to say, had intimated his desire to retire on the ground of ill-health, and Mr. Francis Galton, F.R.S., had been nominated chairman in his place. The committee considered that they were carrying on a work of no mean value to social statistics, supplementary to the national census. The classification of the returns is based on the principle of collecting into a standard class as large a number of cases as possible, which imply the most favourable conditions of existence in respect to fresh air, exercise, and wholesome and sufficient food, and specialising into classes, which may be compared with this standard, those which depart more or less from the standard class. This system was recommended for adoption by Mr. C. Roberts. The influence of mental and manual work, the influence of food and clothing on development, and of climate and sanitary conditions, and the influence of town and country life, may, as materials accumulate, be determined. The statistics already received have been formed into twenty-eight tables.

The President of the Section (Mr. G. W. Hastings, M.P.), in the course of his address, subsequently delivered, said that what Dr. Farr had done for the Registration Office, to which he had been so long attached, it was needless to say. To him it was mainly due that the carefully compiled tables, the admirable reports, the impulse given to the sanitary and social improvement, had been carried out as they had been. Many had earnestly desired that Dr. Farr should become the head of the department which he had done so much to create and amplify. That was not to be, but none the less—rather more—was a great debt owing by the people to a man who had laboured for them so continuously. A committee had been formed to raise a testimonial adequate, in some degree, to Dr. Farr's eminent services.

In the evening an address was delivered in the Music Hall by Mr. Francis Galton, F.R.S., on "Mental Imagery."

We may mention other papers next week.

GLASGOW MUNICIPAL BUILDINGS COMPETITION.

THE architect called in to advise in this competition (Mr. C. Barry) sent in his report on Tuesday last, and it will probably be dealt with by the Corporation this week. On Monday next the whole of the drawings will be open for two or three days to the view of the Corporation and the competitors; and then for two or three days more for the general public, in the Corporation galleries, Sauchiehall-street.

We have already received a letter from an architect complaining as to the result, but as nothing certain can yet be known, this is, at any rate, premature.

SEMINARY AT CLAPHAM, FOR THE ROMAN CATHOLIC DIOCESE OF SOUTHWARK.

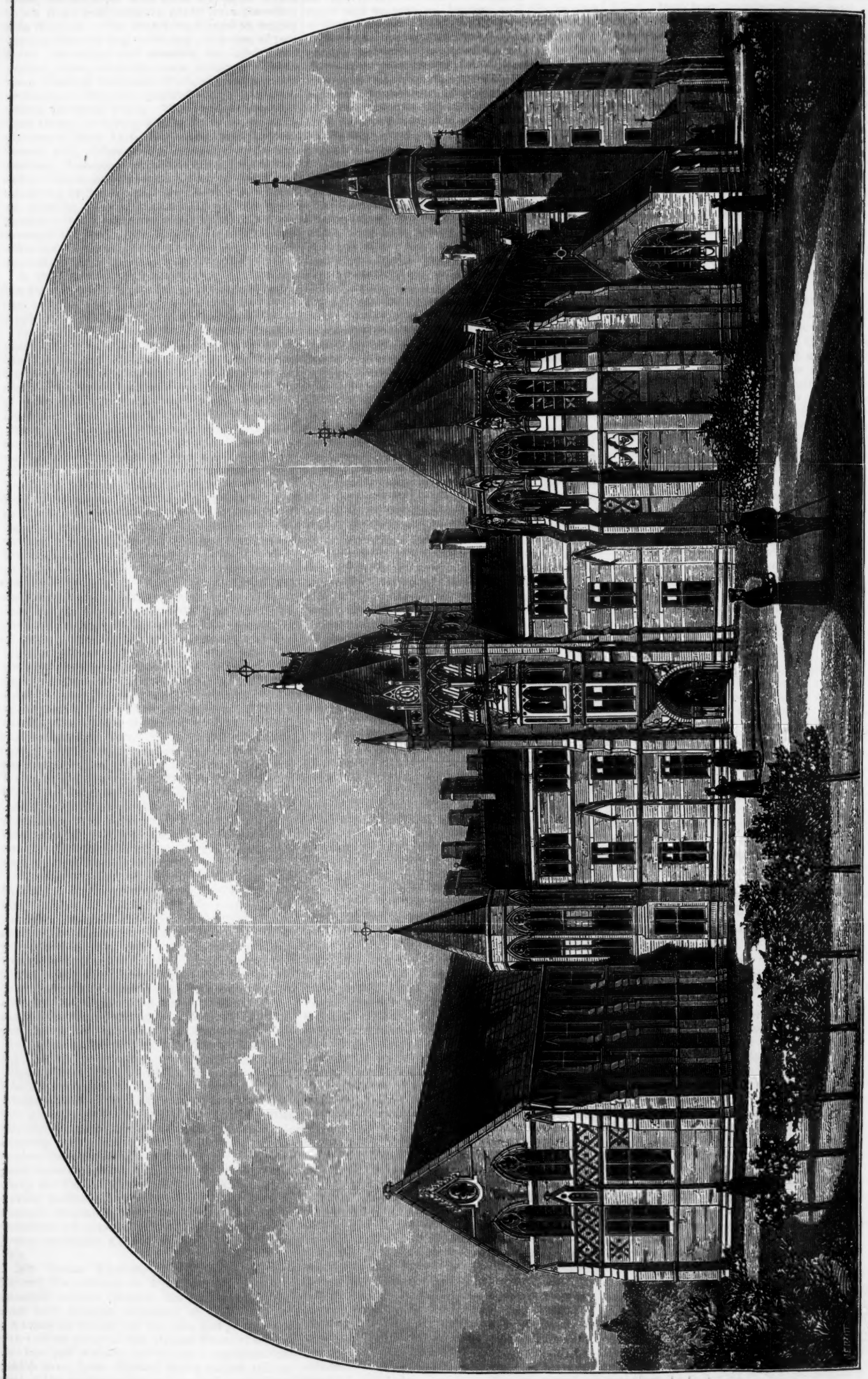
THE design is planned to suit the somewhat restricted site in the Clapham-road; care, however, has been taken to secure ventilation, and at the same time to obtain a certain portion of the sun's rays to every part of the building at some part of the day. The style is a free adaptation of the Decorated. The walls will be faced with red brick and freestone dressings; the roofs will be covered with green slates.

The building will afford accommodation for sixty-nine students (each having a separate bedroom), and with suitable lecture-hall, museum, and recreation-rooms. There will be apartments for the bishop, the president, the vice-president, and three professors; large refectory, library, chapel, and the usual kitchen offices.

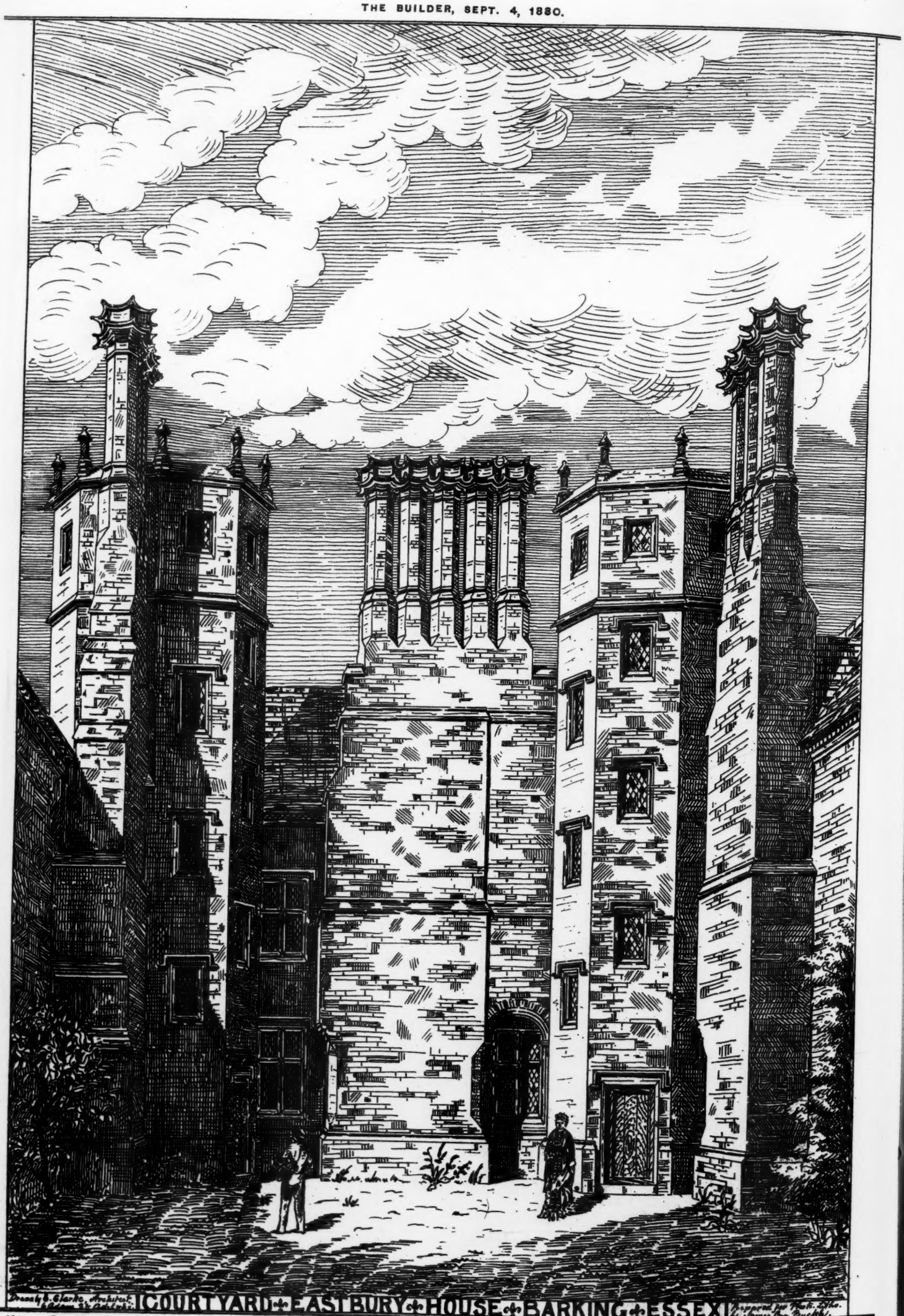
It is proposed to carry out the work in sections, the first of which will provide accommodation for sixteen students, the professors being lodged for the present in the existing house.

The total cost of the buildings will be about 37,000*l.* The architect is Mr. John Crawley, of Bloomsbury-square.

A Testimonial.—On Monday, the 30th of August, the *employés* of Mr. George Jennings, sanitary engineer, Palace Wharf, Stangate, met at the Mitre Hotel, Palace-road, to make a presentation of a handsome timepiece to Mr. John Gordon, foreman of plumbers, on his retiring from the firm, after nine years' service. The chair was taken by Mr. R. Lucas, cashier of the firm, and a pleasant evening was spent.



SEMINARY AT CLAPHAM FOR THE R.C. DIOCESE OF SOUTHWARK.



Drawn by Clarke, Architect, Barking & Bradford.

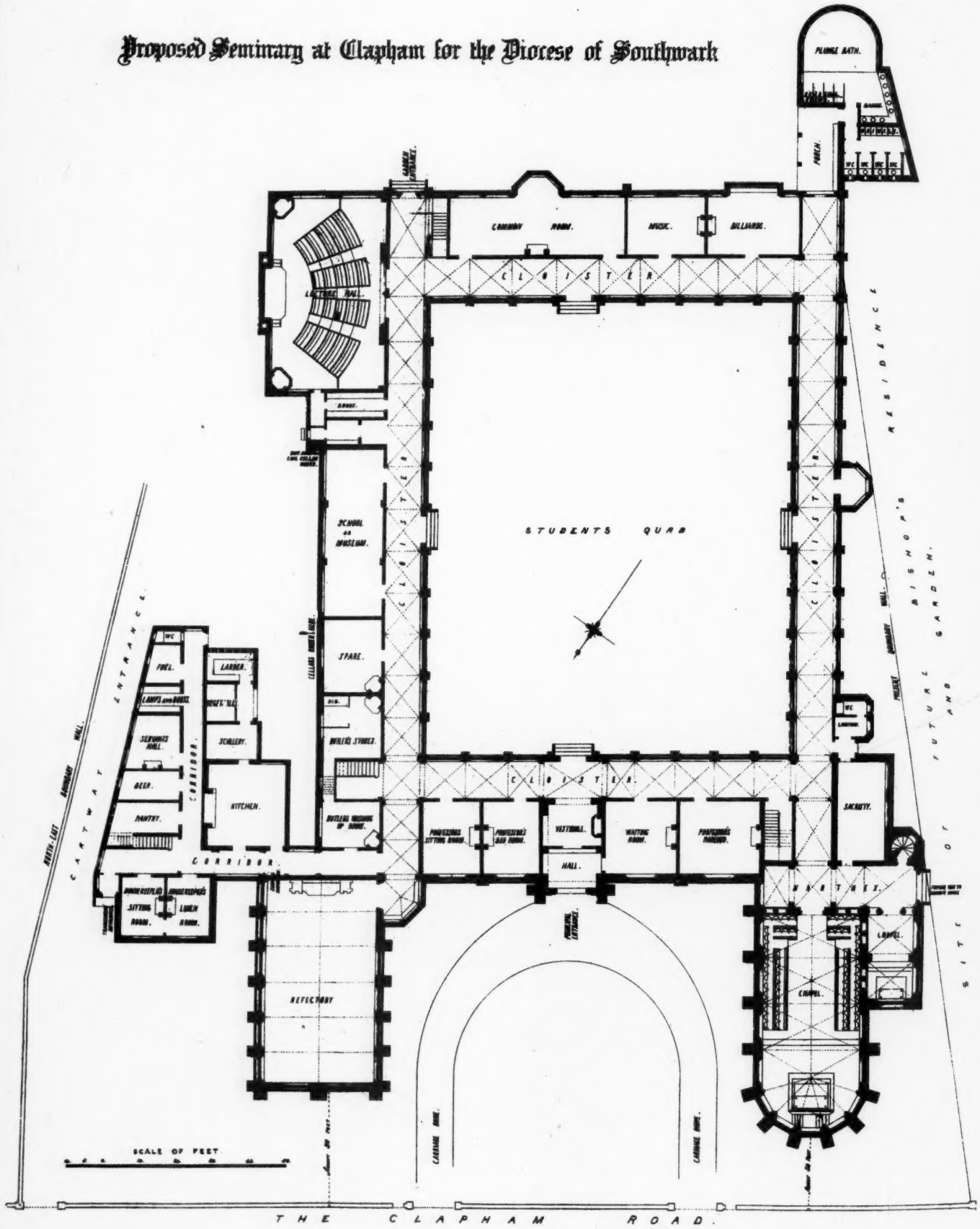
COURTYARD to EASTBURY to HOUSE to BARKING to ESSEX

Prepared for Photo-Litho. by Whiteman & Bass.

Whiteman & Bass *Photo-Litho* 236, High Holborn

Wyman & Sons, Printers, 74 Queen St.

Proposed Seminary at Clapham for the Diocese of Southwark



GROUND FLOOR PLAN.

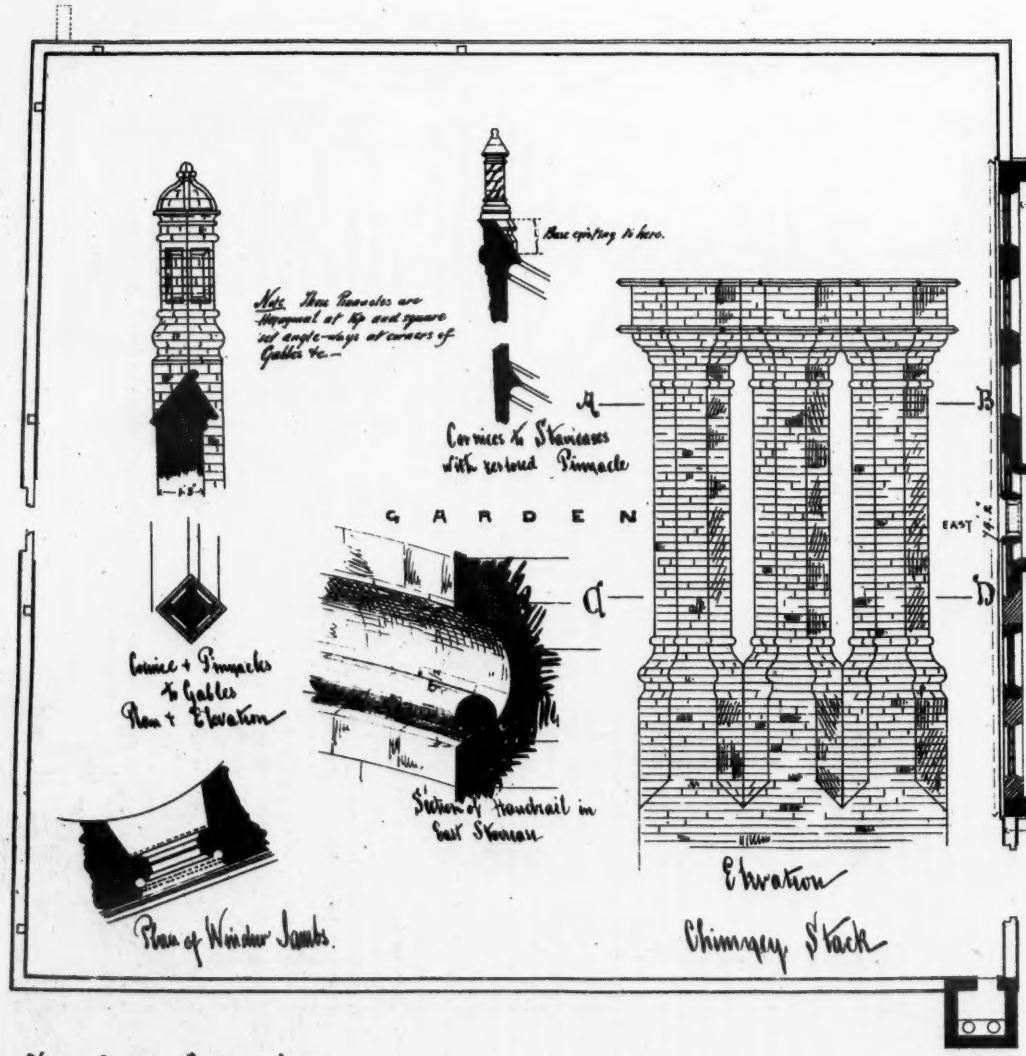
Whiteman & Bass *Photo-Litho* 236 High Holborn

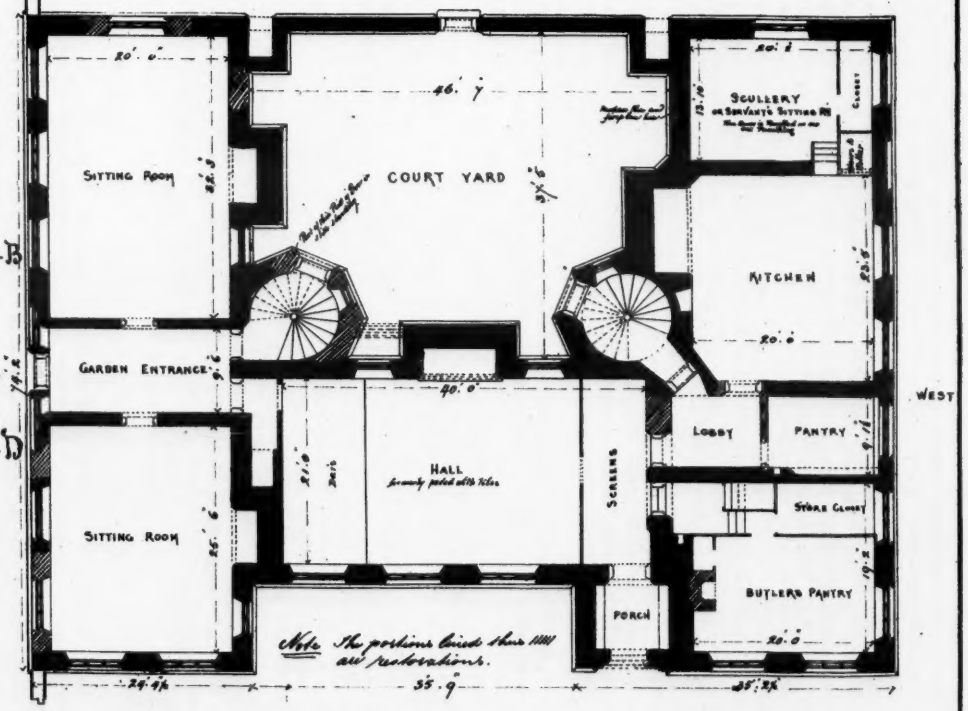
Wyman & Sons Printers, 74 Queen St

Whiteman & Bass *Photo-Litho* 236, High Holborn

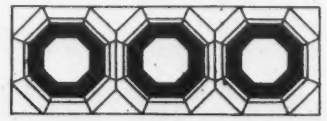
Wyman & Sons, Printers, Gt Queen St.

EASTBURY HOUSE, BARKING, ESSEX


Base existing to here.
Note. These Pinnacles are Hexagonal at top and square at angle-ways at corners of Gables &c.
Cornices & Stanchions with restored Pinnacle
GARDEN
Cornice & Pinnacle to Gables Plan & Elevation
Section of Handrail in East Staircase
Plan of Window Jambs.
Elevation
Chimney Stack



Plan of Ceiling looking East



Plan of D.

Scale of Details ½" to One Foot.

Measured and Drawn by Edward Clarke, Architect, 6 Adam Street, Adelphi, W.C.

GROUND PLAN

Whiteman & Bass Photo-Litho 236, High Holborn

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MILTON-NEXT-SITTINGBOURNE COFFEE-TAVERN.

AT the beginning of this year a public meeting was held to discuss the desirability of establishing a coffee-tavern in Milton, and there being a strong feeling that such an institution would prove a means of doing good, it was decided to form a Coffee-Tavern Company, and invite applications for shares; a considerable number of which were at once taken. The offers of several sites were obtained, and eventually one in close proximity to the quay was secured at a cost of 360*l*. Mr. W. Leonard Grant, of Sittingbourne, was appointed architect to the Company, and instructed to prepare a design for a house to cost about 900*l*. Tenders were invited for the work, and that of Mr. J. Seager, of Borden (823*l*. 10*s*., exclusive of fittings), was accepted. The accommodation provided is as follows: On ground-floor, a bar 26 ft. by 13 ft. 6 in. (approached by angle-entrance), coffee, smoking, and store-rooms, kitchen, scullery, and usual offices; a separate entrance and staircase leading to a hall 39 ft. by 26 ft. on first-floor; on second-floor is provided a manager's bedroom, four cubicles for lodgers, linen-stores, and w.c. The building is faced with warm-coloured stocks, with red brick dressings, chimneys, piers, &c., and is covered with red plain tiles. The ceilings of hall and bar are to be panelled with V-jointed boarding, varnished, the panels being formed by the iron-girders (which are exposed, and painted a light blue colour), with moulded wood cross-girders. The memorial-stone was laid by Miss Hinde (one of the oldest inhabitants of the town) in the presence of the secretaries of the Church of England Temperance Society (the Rev. J. H. Potter, and Mr. A. Sargant), the chairman and directors of the company, and a large concourse of spectators.

EASTBURY MANOR HOUSE, ESSEX.

THE manor of Eastbury was part of the possessions of the Abbey of Barking, which latter was dissolved in 1539. In 1545 the manor was granted to Sir W. Denham, kt., sheriff of London, who, dying three years after, bequeathed it to his heir, William Abbott, who, after holding it eight years, conveyed it to John Keele, the latter selling it in the same year (1557) to Clement Sisby.

Tradition relates that the date 1572 was at no remote period conspicuous on several parts of the existing edifice, notably in the hall and on the water-spouts, and there is reason for assuming that the present structure was erected by Clement Sisby. The manor continued in the possession of this family for fifty years. In or before 1608 it was sold by Thomas Sisby to Augustine Steward. The property again changed hands in 1646, 1714, 1740, 1773, and 1802. After which date it was occupied by a Mr. Scott, who made considerable alterations—tearing up the floors and taking down the chimney-pieces, some of which were sold to the Rev. T. Fanshaw, by whom they were placed in his house at Parsloes, where, we believe, they still exist. The manor was sold by Mr. Bushfield in 1845 to Mr. Sterry, in whose possession it still remains. At the time these drawings were made the occupier (Mr. F. Whitbread) had expended a considerable sum in restorations. The house, which was built in the reign of Queen Elizabeth, is entirely of brick. At this period a marked change is observable in the general arrangement of country houses. Prior to this time houses were built round a central courtyard, with all the windows looking upon it,—a few loops and such openings as were required for defensive purposes only being made in the outer walls. Owing to the less turbulent state of the country, and the greater security against outrage, buildings were now erected more in accordance with the requirements of a domestic dwelling than with those of a feudal stronghold. One of the most radical changes being connected with the windows, which were made of larger size and boldly placed in the outer walls, instead of looking upon an inner court.

The present plan of the house consists of a south front and two wings, the fourth side of the court being closed by a blank wall (see plan and perspective sketch).

The principal entrance is on the north front, being an arched opening with traceried spandrels in cut brickwork. The ground-plan is self-explanatory; the portions shown with cross lines are restorations. On the first-floor there was a room over the hall of similar size, having the walls decorated with paintings. On one side a number of men and women, in the costume of the period, under niches; and on the other side a painting representing the "Miraculous Draught of Fishes." The western wing appears to have been devoted to sleeping apartments, whilst the eastern wing comprised one large chamber. On the second floor were three galleries extending the entire length of each block. The roofs which are now open to the tiles, were ceiled, so that each gallery formed a long low chamber, with a cradle roof and a large window at each end; the side windows formed small recesses or pseudo bays. There are to be found such galleries in most old houses of this period, *e.g.*, Knole, Hever, and Haddon Hall. In the eastern gallery the remains of decorative embellishments in distemper are clearly discernible.

The house at present is, in many parts, in a ruined and dilapidated condition. That portion which is inhabited has been considerably altered and modernised.

Our perspective view shows the courtyard in its original condition, not as it at present exists.

The tower staircase in the south-east angle had a well-cut handrail in brick (a detail of it is given), which denotes this as the principal staircase, there being no such handrail in the tower now standing.

The general character of the building and details are well worthy of study, and notwithstanding the ravages of time and the destructive proclivities of some modern restorers, there still remains sufficient of the original work whereby we can form some idea as to the beauty and stateliness of the edifice originally.

Our illustrations are prepared from measured drawings by Mr. Edward Clarke, architect, 6, Adam-street, Adelphi, made some years ago.

THE LATE MR. CHAS. LEE.

WE regret to have to announce the death of Charles Lee (formerly of Golden-square, and more recently of Adelphi Terrace), whose name has long been familiar as one of the leading London surveyors. The event occurred at his residence, Ravenswood, West-hill, Putney-heath, on Saturday last, at the age of seventy-six, after an illness of four years' duration, brought on by overwork in his profession. Losing his parents in early life, Mr. Lee was brought up with his relative, Mr. Williams, a surveyor of the old school, practising at Islington, and he was placed to learn the practical part of the profession with Mr. Thomas Cubitt, the well-known builder of Belgravia. After thus spending two or three years he entered as articled pupil the office of Mr. John Nash, the Government architect of the day, and while there took an active part in carrying out the great improvements at the West End, in the construction of Regent-street, the demolition of the King's-mews at Charing-cross, and the formation of Trafalgar-square, as also the Regent's Park and the buildings adjacent, having for his fellow clerks the late Mr. James Pennethorne, Mr. Mathieson (afterwards the Government architect for Scotland), and other well-known members of the profession who have now passed away. On Mr. Nash's retirement Mr. Lee became associated with Mr. Jas. Morgan, who succeeded to a part of Mr. Nash's practice, and was by profession chiefly an engineer, having constructed the Regent's Canal, in which Mr. Lee was largely engaged. While with Mr. Morgan, Mr. Lee prepared the designs and superintended the erection of the Haymarket Theatre as it stood prior to the recent alterations. He afterwards entered into partnership with the late Mr. Henry Duesbury, and with him carried out, among other works, the Town-hall, Derby; the Derby Lunatic Asylum; two or three churches and schools, in the first days of the Gothic revival; as also several houses in Westbourne-terrace and the neighbourhood. On Mr. Duesbury's retirement, Mr. Lee took into partnership in architectural matters the late Mr. Thomas Talbot Bury, who, as a pupil of the elder Pugin, had formerly been brought much in contact with Mr. Nash. Messrs. Lee & Bury carried out churches at Bovingdon, Aldenham, Battersea, and Weymouth, and some other architectural works. After the dissolution of this partnership, Mr. Lee practised alone for some time; but for the last sixteen years the names of Mr. Lee's sons with that of Mr. William Pain (for many years in the office) were associated with his own, the firm being Messrs. Lee, Sons, & Pain. Industrial Schools at Anerley, Sutton, and Wandsworth-common; alteration of St. James's Church, Piccadilly; St. Luke's Church, Holloway; St. John's Church, Putney; many private residences, and notably, of late years, the rebuilding of Her Majesty's Theatre after the fire, may be mentioned as further illustrations of Mr. Lee's practice.*

It is, however, in connexion with his lengthened experience and extensive practice as a surveyor and valuer that Mr. Lee's name is best known. Commencing in the early days of the Tithe Commutation and Poor-rate Assessment Acts and of the valuations for the Metropolitan Improvements, he was cotemporary with the late Mr. Higgins, Messrs. G. Allen & Porter, Mr. John Shaw, Mr. Wiltshire, and others, then the leading surveyors, but many of whose names are scarcely recognised by the present generation. From that time till within the last four or five years Mr. Lee may be said to have been concerned in most of the important rating or compensation cases which have occurred in the metropolis and neighbourhood. He valued for rating and for other purposes, on several occasions, the parishes of St. James, Westminster; St. George, Hanover-square; Lambeth, Wandsworth, Battersea, Putney, Wimbledon, and Fulham, and was employed for or against nearly all the water and gas companies. In the year 1853 he valued for re-assessment the whole of the property supplied by the New River Company. He was engaged in the compensation cases for Battersea Park, the South-Western Extension to Waterloo, the Blackwall Railway, and later in the London, Chatham and Dover, and Charing-cross Railways, and other railway Extensions and Improvements; the Hull, the Sunderland, and the Birkenhead Docks, the Cambridge Gas and Water Companies, Carlisle Water Company, and the Dundee Gas Company. He also acted on the part of the Government in the important cases arising out of the Defence Works at Portsmouth, Plymouth, Sheerness, &c. He had also considerable practice in the management and development of building estates; he arranged the sale and letting of the Old Grand Junction Waterworks' Reservoir (now the site of the Great Western Railway Terminus and Norfolk-square), the Copenhagen Estate at Islington (in connection with which he sold to the City the land for the New Cattle Market), and those of many private owners.

Mr. Lee was a man of good general ability and wonderful power of memory, possessed of great tenacity of purpose and of a genial and kindly disposition to those with whom he was intimate. His death will be the most regretted by those who knew him best.

Upon the frame of an engraving which hung over the fireplace in Mr. Lee's room in Golden-square he had pasted a cutting from some book, containing the following lines:—

"RULES FOR SUCCESS.

Be firm; one constant element in luck,
Is genuine, solid, old Teutonic pluck;
Stick to your aim; the mongrel's hold may slip,
But only crowbars loose the bull-dog's grip;
Small as he looks, the jaw that never yields,
Drags down the bellowing monarch of the fields."

The power of sticking to his aim, combined with excellent natural ability, was the secret of Mr. Lee's success in his profession; and in these days of divided aims in life the lines are possibly worthy of reproduction.

Cost of Cologne Cathedral.—The *Wochenblatt für Architekten und Ingenieure*, discussing the question of the cost of Cologne Cathedral, says:—"The sums which between 1821 and the present time have been contributed to the cathedral building fund, both from public and private sources, amount to 18,000,000 marks (900,000*l*.). This amount has been pretty evenly expended on the erection of the towers and the additions to the church. If to this we add the moneys contributed during past centuries, and notably what has been sunk in the colossal foundations and spent in purchasing various necessary parcels of ground, it will appear that the cathedral as it now stands represents about 40,000,000 marks (2,000,000*l*.)."

* Illustrations will be found in our pages of St. Luke's, Holloway (1859, p. 439), Her Majesty's Theatre (1869 p. 607), &c.

WIND-PRESSURE.

Among the many points which were brought into notice during the Tay Bridge inquiry there was no one of greater interest than the question of wind-pressure. To builders the effect of atmospheric disturbances had long been familiar, and the records of destruction, both among finished structures, but more especially in the case of gables during the course of erection, are neither few nor far between. It is somewhat astounding, therefore, to find that a danger to which every structure that is acted upon by the force of the wind is more or less exposed should not only have almost entirely escaped the notice of engineers, but should also have failed to elicit that amount of attention on the part of scientific investigators which in other branches of the profession generally afforded some reliable data as a foundation for the every-day use of practical men. Nevertheless, there is some apology to be found for the indifference with which it has been hitherto regarded by engineers in practice. Until lately the allowances that have been made for resisting what may be spoken of as the ordinary statical strains to which such structures as high bridges are more especially subjected, have been considered more than sufficient to withstand the force of the wind when added to the lateral strains thus provided for. In this way wind-pressure in the every-day practice of civil engineers in this country came to be very much overlooked, and although a large allowance has always been made for atmospheric disturbances, both in France and in America, the subject has never attracted much attention in England. The failure on the part of science to supply reliable information seems to have confirmed the indifference which arose from the matter having been considered of little practical importance.

The exceptional circumstances under which it was proposed to throw a bridge over the estuary of the Forth brought the question into notice, and in the light of the terrible disaster of the night of the 28th of December last it would have been well if the inquiry had been made earlier, with special reference to the Tay Bridge as well.

In looking into the history of the subject it appears that the source of information to which engineers generally applied was a table presented by Smeaton to the Royal Society in 1759. Omitting atmospheric phenomena, which experience had shown to be confined to the tropics, he estimated the pressure of the wind in this country at six pounds per square foot of surface for high winds, eight or nine pounds for very high winds, and twelve pounds for a storm or tempest. These figures no doubt obtained considerable sanction on account of the distinguished character of the authority with which they were associated, and from the fact that the structures, more especially lighthouses, which had been presumably constructed on the basis of these estimates, had been constantly exposed to the utmost fury of the winds, and remained as monuments of their ability to resist them. But even in the face of such assurances there was at least one good reason why engineers in this country should have reconsidered the subject, from the fact, that in France and America the practice has been to allow 55 lb. and 50 lb. for wind-pressures respectively. Besides the very much greater margin which prevailed abroad, there were isolated instances in this country which proved conclusively that the wind reached a maximum intensity far beyond that which had been laid down by Smeaton. There are several authentic cases of railway carriages having been upset by the wind, both in France and America, and India as well, but of still greater importance as affecting the rules for providing against wind-pressure in the British Isles, is the record of a carriage having been thrown over by a hurricane, on the Chester and Holyhead line, in 1868. Quoting from the report of the Commissioners appointed to inquire into the circumstances attending the fall of the Tay Bridge, it appears that "the pressure required to overturn railway carriages may be taken to vary between 28 lb. and 40 lb. per square foot," so that it became necessary in the light of this exceptional instance to inquire how far such a pressure was likely to act upon the more extended surface of a wide and lofty bridge. It is here that we find a great discrepancy of opinion among practical men and an absence of reliable information to assist us in forming a judgment. It appears that there is no record of any pressure approaching to that which upset the railway carriage on the Chester line ever having acted upon an extended area, but on the other hand, there is no record of how great the extent of surface may be over which such an exceptional pressure may exert its force. It appears that a hurricane at Walmer, of an intensity that perhaps exceeded the pressure which upset the railway carriage, acted over a width varying from 450 ft. to 700 ft., and that a somewhat similar cyclone passed over the Isle of Wight during the winter of 1877. In the face of such facts it is difficult to escape from the conclusion that the wind may in a similar manner act upon a lofty structure of similar width, and that, therefore, it is imperative to provide against the possibility of its doing so.

Nevertheless, when the proposal to build a bridge across the Forth, with spans of 1,600 ft., came to be discussed, a very different conclusion was arrived at. It appears, as our readers have heard more than once, that Mr. Barlow and Dr. Pole, to whom the subject was remitted for detailed investigation, not being satisfied with their own judgment, consulted the Astronomer-Royal, and afterwards spoke of his opinion as "highly authoritative and valuable." The conclusion at which he arrived was "that the greatest wind-pressure to which a plain surface like that of the bridge will be subjected in its whole extent is 10 lb. per square foot." Although the plans for the Tay Bridge had been completed a long time before this opinion was made known, Sir Thomas Bouch seemed to have considered that it was applicable to that undertaking, and no doubt felt his mind much relieved in consequence. When the Astronomer-Royal, however, was examined before the Commissioners he drew a distinction between the two bridges, which, in the light of the opinion already referred to, is somewhat difficult to understand. In his letter to Dr. Pole and Mr. Barlow he said that although "upon very limited surfaces, and for very limited times, the pressure of the wind does amount sometimes to 40 lb. per square foot, or in Scotland probably to more," yet that, looking at the character of that bridge, which was a suspension-bridge with two spans of 1,600 ft. each, the greatest amount of pressure to which it would probably be subjected on its whole extent, would, in his opinion, not be more than 10 lb. per square foot. If an engineer, without further explanation, had drawn the conclusion that this opinion meant that the wind-pressure would not be more than 10 lb. upon a span of 1,600 ft., but that it might be 40 lb. or 50 lb. over an area of 450 ft., he would have found it consistent with what the Astronomer Royal afterwards stated; but, at the same time, we do not think that one engineer in a hundred would have made such an interpretation of the original opinion.

As matters stand at present, we have first the authority of Smeaton, and afterwards the opinion of the present Astronomer-Royal confirming it, for undefined areas between 450 ft. and 1,600 ft. On the other hand, the conclusion arrived at by one of the Commissioners on the Tay Bridge is that the estimate of French and American engineers is much nearer the mark, and "that there can be no reason to doubt that there may be wind-pressure of 45 lb. and even 50 lb. in this country." In saying this, however, they do not commit themselves to any opinion as to the width of the structure, which would be sufficiently great to admit of a lower estimate being taken. To make matters still more complicated, Mr. Baker, who "is a civil engineer of eminence," and "who seems to have devoted much time and attention to the subject of wind-pressures," said that for the last fifteen years he had looked very carefully for evidence of any structure capable of standing a uniform pressure of 20 lb. which had been blown down, and that he had never found a single instance,—that there were hundreds of buildings in this country that would be blown down with a pressure of 20 lb. on the square foot, and miles of wall on the edges of cliffs and on open downs which would be blown down with a pressure of even 13 lb. In the face of all this apparently conflicting evidence, there will be a natural anxiety on the part both of the travelling public and the engineering profession to have the subject thoroughly investigated, and meanwhile there is every prospect that the promoters of such undertakings as the Tay Bridge will find it a very difficult task to raise money unless they are able to convince subscribers that the question of wind-pressure has not only been successfully investigated, but that measures have been taken to render such lofty structures thoroughly secure.

LEAD-MINING AND SMELTING IN DERBYSHIRE.

The annual excursion of the Chesterfield and Derbyshire Institute of Mining, Mechanical, and Civil Engineers took place a few days since under the presidency of Lord Edward Cavendish, M.P. The principal visits made were to several of the best-known lead-mines in the county, especially to the Millclose Stoop, from which (says the *Mining Journal*) is drawn as much lead as from all the other mines now being worked in Derbyshire. To the extraordinary customs or rights as regards lead-mining which prevail in the Peak and other districts must be attributed the small quantity of ore raised for the number of mines opened out, for men without capital are able to sink and carry on operations in the most primitive manner, without any machinery whatever.

On the last day of the gathering Mr. Stokes, of Derby, Assistant Government Inspector of Mines for the district, read an interesting paper on "Lead and Lead-Mining in Derbyshire." The lead-mines, it appears, became the property of the Crown at a very early period; and in the old Roman town of Wirksworth there was lead ore raised in 714, the dues going to support a nunnery at Repton, the abbess of which, it is said, sent a sarcophagus of lead to Croyland, in Lincolnshire, for the interment of St. Guthlac, a monk, the lead having been obtained from the Wirksworth Mines. Mr. Stokes showed from well-founded data that lead was raised in Derbyshire during the reigns of Tiberius Cæsar, Domitian Cæsar, and Hadrian in the early part of the Christian era. In 1469 the mineral duties north of the Trent were leased to Richard Earl of Warwick, and others, for a term of forty years. At the death of Charles II. the Dowager Queen Catherine had the mines of Derbyshire. About seventy years ago Mr. Richard Arkwright purchased the lease of mines from the Rolls family, and it is still held by the descendant of the former. In the High Peak district since 1690 they have been held by the Dukes of Devonshire, having been leased from the Duchy of Lancaster. Some of the customs prevailing 200 or 300 years ago in connexion with the mines were most peculiar, and we are told that whisky was not allowed to be taken into a mine lest it should frighten away the ore. In relation to the Acts on mining passed in the reigns of Edward I. and VI., Philip and Mary, there is an old poem or rhyme, by Manlove, a local writer, who in allusion to them says:—

> "For stealing ore twice from the minery
> The thief that 's taken fined twice sha'l be,
> But the third time that he commits such theft
> Shall have a knife stuck through his hand to the heft
> Into the stone, and there till death shall stand,
> Or loose himself by cutting loose his hand;
> And shall forswear the franchise of the mine,
> And always lose his freedom from that time."

As to the mode of smelting lead there are still standing records in what are known as the Bole Hills, the ancient smelting hearths being termed "boles," and consisting of loose stones built upon the brows of hills. Upon these rudely-constructed hearths wood was laid, and over that again the ore was placed. Fire was then applied to the wood, and then the air at first was the only means of kindling the fire to the necessary heat to smelt the ore. After a time bellows were introduced, in some cases being so large they had to be worked by horses. For smelting, it was a custom at one time to cut down timber anywhere within reach for the purpose, and one of the articles made at Great Barmote Court, held in 1665, was,—"We say that for the payment of the said lot miners within the wapentake of Wirksworth ought to have liberty to work the ground within the wapentake, and to have timber also in the king's wastes to work their ground withal, and egress and regress from the highway to their grooves and mines." The timber was not only used for smelting the ore, but it was also burnt for breaking down the sides of veins and getting the mineral before blasting by gunpowder was employed in Derbyshire, as shown by another Court article,—"We say that any miner in an open rake may kindle and light his fire after four o'clock in the afternoon, giving his neighbour lawful warning thereof." This free use of timber in all probability was abandoned when the value and use of coal and gunpowder became known. Bole hills, however, are the most clearly defined geographical position of the ancient smelting hearth; but the word "tor," of which there are many in Derbyshire, may also indicate a smelting-place. The

mining customs first received the Royal sanction from Edward I., after a petition from the miners had been presented to him and an inquiry held at Ashbourne, in 1287, by the king's direction, by the Sheriff of Derbyshire. Those customs have been modified, and reduced to legal rights by Acts passed in 1851 and 1852. The right of all persons to search for, dig, and sink mines on any person's land seems anything but right to the owner, who sees his land cut up, roads made across his fields, and water ingress and egress allowed to the miner. But, at the same time, it should be remembered that the miner had the same rights when the whole of the Peak was a "vast howling wilderness" without cultivation, and belonged to the Crown; also that the present owners bought the land subject to those privileges. There is little doubt that the mining rights at one time, as well as the income from the lead, were of more importance than the surface value,—so that it was of advantage to the Crown that every encouragement should be given to the miners to pursue their calling. These customs once established, have been clung to by the miners with the greatest tenacity, and have been fought for in the law courts, and, as they have been confirmed by the Acts of 1851 and 1852, both miners and landowners know the limit of their privileges as well as their inconveniences.

As to lead itself, Mr. Stokes remarks that some writers consider the veins to be a sedimentary deposit, slowly accumulating or growing similar to stalagmites; whilst others consider that the mineral has been thrown up from below, similar to all igneous rocks, filling fissures or cracks in the strata. Engineering skill and science have done little to improve the mode of working in the lead mines of Derbyshire, which in most instances is somewhat similar to what it was 100 years ago or more, or, indeed, little better than it was in the old Saxon period. In the whole of the lead-mining districts there are only two shafts where the ascent and descent are performed by mechanical means. In all the others ladders are used, or else a still more antiquated system, called "stemples" and "footholds." Stemples are hand and foot rests of wood, driven in horizontally in the shaft, up which the miner climbs by alternately stepping from one to the other, with the risk of being killed by falling to the bottom of the shaft should he miss his hold. In the large mines there are three classes of men employed underground,—tutmen, tributers, and daymen. Tutmen work the levels, tributers work the ore after it has been proved by the levels; and where work is let by the fathom it is called tutwork. As showing the value formerly of some of the mines, it is stated that in 1769 the viewers' tithes for the Wirksworth mines alone were 1,000*l.* per annum.

THE CONDITION OF CISTERNS.

THE official water examiner, Lieut.-Col. Frank Bolton, makes some observations on this subject in his last report, to which attention should be paid. We willingly give them the additional circulation of our columns:—"In the absence of a duly authorised and official 'standard of filtration' regulating the quantity of water to be passed through a given area in a given time, it has been found during the past eight years that when the rate of filtration does not exceed 540 gallons per square yard of filter bed each twenty-four hours, the filtration is effectual, and this has been generally recognised as a tentative standard rate of filtration. The water companies now nearly all keep within this limit, but it is disheartening to reflect that, notwithstanding the efforts that have been made and the large expenditure that has been incurred in works for properly treating and improving the quality of the water, these efforts are rendered nearly abortive and but of little value by the apathy and carelessness of a great number of the householders. The water delivered for domestic purposes is frequently deteriorated after leaving the companies' mains by the dirty state of the cisterns on the premises of the consumers. Many of the cisterns, tanks, and butts for containing water in small tenement houses in the metropolis are in a disgusting and filthy state. An opportunity for inspecting these presents itself when travelling on some of the metropolitan and suburban lines. Cisterns may be seen without lids and with portions of rotten lids floating in the water, full of rank and decaying vegetation, and other most objectionable substances, such as old rags and paper; and on closer examination the contents would show more or less organic deposit, and under the microscope would be found to abound in infusorial life. All cisterns should, therefore, be properly covered and be frequently cleaned out, and every care should be taken to prevent the contamination of the domestic supply after delivery. Now, as heretofore, it appears to be the rule in building a certain class of houses to place the cistern over the water-closet with an untrapped waste-pipe communicating with the drains. These cisterns are often open and regularly receive the drippings from the roofs and gutters; they are, moreover, in close proximity to the dust-bins and other deposits of filth and garbage, while children amuse themselves by throwing all sorts of dirty rubbish into the water, including dead puppies and kittens, with an occasional cat. These are facts known by personal observation. The purest and best filtered water in England would be poisoned by such a system of storage.

The Public Health Act of 1875, section 70, gives power to any local authority, in case of complaint, to inspect and remedy such evils, but, probably, the only remedy for this state of affairs will be found in the establishment of the constant supply system and the consequent total abolition of these unfit receptacles; meanwhile, and until the system of constant supply is completed, the owners and occupiers of houses are surely very wrong in permitting such a condition of things to exist."

NATIONAL INSURANCE.

AT the annual conference of local government administrators of the four northern counties of England, held recently, at Gilsland, under the presidency of Earl Percy, Mr. Cropper read a paper on "National Insurance." At last year's conference Mr. Cropper read a paper on the same subject, but too late for discussion, so he read another this year amended so as to include knowledge acquired during the year. Lord Carnarvon said, that as we compelled the solvent to provide for the destitute, it could not be wrong to make a man provide for himself. It would be well if such provision could be made voluntarily, but it had better be enforced by law than be left wanting. In Germany payment to sick societies was compulsory, masters of artisans being bound to deduct the fortnightly payment due to the clubs, and no difficulty ever arose in the practice of this rule. In the third place his lordship said the majority of existing British Benefit Societies were insolvent. British working men earned higher wages than the same class in any other country, yet they expected to be supported in their old age. The sick-club or friendly society was a man's natural resource. Lord Carnarvon said that, in 1879, 150 registered friendly societies became insolvent. A million and a half of people now belonged to societies which professed to provide for sickness and infirmities, and probably most of them would find their payments thrown away, and of no use when the time of their need came. Lord Carnarvon proposed to reduce the cost of insurance by making every man join in payment. Many contributors would not seek the benefit. Yet it was not unfair as a national scheme, because it would not be asserted beforehand that anybody would not claim, and the ease to the poor-rate would overcome any objection to it. The London and North-Western Railway Company insisted upon a deposit of 2½ per cent. of the salary, and added a similar amount. A servant on leaving with a good character could claim half, and if rendered incapable he received an income of one-third his pay. He did not believe a compulsory system of insurance would ever take the place of the Poor-Law. There would still be women and children of stray workmen who had been missed. It would not do the work of all the existing sick societies, because it would lack the aid of the self-interest of the members of those societies which at present helped to check pretence. Employers also might object to make the deduction, and might think that in the end they would have to pay the insurance, and add it to their workmen's wages. But the employers would soon learn their own interest, and they rarely objected to rules, however arbitrary, if only applied alike to all their competitors in trade.

In the discussion which followed, Sir Charles Trevelyan said he gave an unqualified opposition to the principle advocated in the paper. He admitted the excellence of Mr. Blackley's notion amid all his failures. Compulsory providence was a pure fallacy. Providence was a moral quality. Man must be able to stand, yet free to fall. Action such as that proposed might turn a man into a machine. Out-door relief was provided for a man if he saved nothing at all, and all the powers in the world would not promote thrift and providence while those diverse influences prevailed. Some friendly societies were now extremely well-managed associations.

GLAZED TERRA COTTA FOR ARCHITECTURAL PURPOSES.

OUR recent articles on terra cotta have brought us communications from two or three manufacturers, amongst others, which seem to show a praiseworthy desire to take any steps that may promise to improve their wares and promote the application of them. We may have occasion hereafter to refer to these.

From Messrs. Wilcock & Co., of Burmantofts, we have received a number of specimens of their glazed faïence, which they, no doubt correctly, consider the most recent development of terra cotta for architectural purposes. The material of which this faïence is made is a very fine fire-clay; it being essential that the clay should be almost chemically pure, otherwise it will not stand the great heat to which the articles are subjected, in order to secure hardness and durability. The clay is prepared in the usual way, and in a thoroughly plastic condition is pressed into plaster moulds, and, indeed, up to the point of being ready for the kiln, is treated precisely as if it were terra cotta, only it is handled with additional care.

When carefully placed in the kiln it is subjected to an intense fire for from forty to fifty hours; after being allowed to cool it is ready for going through some preparatory processes prior to being glazed. These processes have been arrived at after repeated trials and failures, but these have resulted in it being now possible to produce a very great variety of effects and colours. If, as they claim, the glaze is imperishable and unaffected by either atmosphere or temperature, the ware is certainly eminently suitable for either interior or exterior decoration.

We are not bound to admire the taste displayed in all the specimens sent, but the plastic quality of the material obviously fits it for fine work, and it admits of a great variety of colouring.

THE RUSSIAN YACHT *LIVADIA*.

THE construction, interior decoration, and furnishing of the Imperial state saloon of this yacht have been entrusted to Mr. Robert Christie, and some of the most important pieces of furniture made for the purpose have been on view for a few days in the rooms of the Royal School of Art Needlework, Exhibition-road, South Kensington. The principal pieces are in what is called white and gold, including sideboard, settee, chairs, &c., and are solid and handsome; the metal-work seems good, and the same may be said of the gilding, but we are bound to say that they please us less than some of the simpler and cheaper furniture to be found near them in the rooms. The forms are clumsy, and the embroidered satin with which the chairs and settee are covered is hard and staring. Some red plush curtains, with an almost metallic lustre, are very rich in appearance.

This School of Art Needlework, by the way, is scarcely so well known as it ought to be.

Bricks.—A correspondent writes:—"What is the average annual consumption of bricks for building purposes in London? I think I saw in a paper that at a meeting of brickmakers, held last autumn at the Cannon-street Hotel, the chairman stated the average metropolitan consumption to be 750,000,000." A precise answer to this could not be given without special inquiries. Mr. W. T. Wiseman, who is agent for many of the manufacturers, supposes in reply to our question, "that probably 800 millions of bricks annually (taking the average of the past five years) are sent to London within a radius of four or five miles from London Bridge."

OBITUARY.

Mr. W. Penstone.—The death of this young architect, from consumption, took place last week. He was a member of the Committee of the Architectural Association last session, but would not allow himself to be nominated again in consequence of his failing health. The noteworthy paper on "Late Wrought Ironwork," read during the session 1878-79, and which we printed, gave a few of the results of considerable study of the work of the seventeenth and eighteenth centuries in various arts. No. 1096 in this year's Exhibition of the Royal Academy showed in clever drawing two buildings erected from his designs. A good draughtsman and hard-worker will be missed in the Association, and another right-minded and pleasant companion remembered with regret.

Mr. Hakewill.—We mention with great personal regret that Mr. John Henry Hakewill, Fellow of the Institute of Architects, died at his residence, 77, Inverness-terrace, on the 30th ult., in his seventieth year. We will take another opportunity to speak of his works. Death has been sadly busy in the ranks of the architectural profession of late.

ROYAL HOTEL, BLACKFRIARS.

WE mentioned briefly in our last that the second section, which completes the building of the "Royal Hotel," at Blackfriars, is now commenced. The work is in the hands of Messrs. Lucas Brothers, who are pushing on rapidly with the contract, in order at as early a date as possible to meet the demand for accommodation at the present hotel, which, large as it is, is not able now to do so. In the new building there will be many arrangements for the comfort of the visitors and the easy working of the business of the hotel. Two high class hydraulic lifts will be erected for conveying visitors and their luggage to the different floors of the hotel. Special arrangements have been made for the safety of the visitors using the apparatus. Mr. E. A. Gruning is the architect, and Mr. F. Colyer is the engineer, who has designed the lifts and other engineering appliances, and will superintend the same in conjunction with the architect. Messrs. Simpson & Co. have the contract for the lifts; Messrs. Siebe, Gorman, & Co., for the heating apparatus; and Messrs. S. J. Baker & Sons, for the wells.

SOCIAL NOTES.

An Extraordinary Delusion.—At the last meeting of the Orrell (near Wigan) Local Board, the medical officer of health in his monthly report stated that one case of scarlatina had occurred at Gathurst, which seemed to have been due to infection imported into the district. The clerk mentioned that there was an extraordinary superstition in the minds of some of the parents in the Board's district. Believing that it was better children should have the whooping-cough while they were young, parents were in the habit of taking their children where whooping-cough was prevalent, in order that they might catch the infection. In one case he knew a woman—the mother of eight children—take her children to a house where there were persons residing suffering from scarlet-fever, so that they might have the fever while they were young. The medical officer said that was a recognised notion amongst the poorer classes. There is evidently wide scope for the use of health primers in our Board schools, and for the missionary zeal of ladies' sanitary associations.

The Coffee-Tavern Movement.—At Kidderminster, a new coffee-tavern, erected for the County and City of Worcester Coffee-Tavern Company in Vicar-street, Kidderminster, was opened on the 14th ult., by Lord Lyttelton, the chairman of the company. The tavern has been built specially for its intended purpose by Mr. Julian, and taken on a twenty-one years' lease by the company.——A coffee-tavern has been opened at Kingston, which, by permission of Prince Leopold, is called the Leopold Tavern. The Prince is a shareholder.

Working Men's Clubs.—On the 17th ult., the building which is to be the head-quarters in future of the Twerton-on-Avon Club Institute and Reading-room (formerly known as the Working Men's Club), together with a new hall in the rear, was opened. Messrs. Carr a short time since purchased the building known as the George Inn, and a plot of ground adjoining, on which the new hall has been erected. The old building has been thoroughly renovated, and fitted for the use of the club. The Club-house has on the ground-floor a library of 700 volumes, a reading-room, and a smoking-room. The first-floor has also three rooms, which will be used for committee, writing, and billiard-rooms, respectively. The new hall, which is built of stone, is capable of holding 400 persons. The builder was Mr. Thomas Harrison, of Twerton, and Mr. J. L. Asher supplied the gas-fittings.

YE ANTIENT HOUSE.*

HOLLOW home oft will come
Rattling to the ground;
Birds will flee, o'er the sea
Other homes will found;
When returned, old one's spurned,
New 's more cheap and sound.

Men of old, as we're told,
Their own time could take;
Strikes unknown, each one shown
What he was to make;
Now-a-days—railway age—
Man must keep awake!

Holy men, living then,
Built both well and strong.
Why? Because each "had pause";
Labour for a song.
Money, too, then, they knew,
Need not "hum along."

Sages say, in his day,
No one gains his crown,—
Be it praise, glory, bays,—
Envy hunts him down;
When he dies *then* fame cries,
"Great is his renown"!

So we praise other days—
Ever sing the past;
Giants, then, were the men
Ne'er to be surpass'd!
Passing by, mockingly,
Pearls before us cast.

Let me stay 'ere I stray
Farther from my theme;
Long and low,—plan so, so,—
Built without a scheme;
Here a stair, leading—where?
Ancient houses seem.

Ceilings low, as you go,—
Mind, you'll bump your head!
Dusty, too,—gracious!—phew!
Roofs, part stripp'd of lead;
Draughts as well—who can tell
Where rats are *not* bred!

Walls so bulged, bricks divulged;
Filled with ghostly sounds;
Rooms so large—turn a barge;
Lumbago abounds.
It is but a draughty hut,
Grown beyond its bounds.

HERBERT.

The Employers' Liability Bill was read a third time in the House of Lords on Tuesday last, having previously passed through Committee, in the course of which passage sub-section 3 of Clause 1 was omitted, on the motion of Lord Brabourne. On the motion, after the third reading, "That this Bill do pass," the Lord Chancellor moved the insertion of the word "any" in the second sub-section of Clause 1, making the clause read as follows;—"By reason of the negligence of any person in the service of the employer who has 'any' superintendence entrusted to him." This amendment was agreed to. Lord Stanley of Alderley then moved the re-insertion of the sub-section in question, which ran as follows:—"Where, after the commencement of this Act, personal injury is caused to a workman. . . . . by reason of the negligence of any person in the service of the employer to whose orders or directions the workman at the time of the injury was bound to conform, and did conform, where such injury resulted from his having so conformed." Lord Shaftesbury expressed his regret at the course taken by their lordships in omitting this sub-section in committee, but the amendment was negatived and the Bill passed.

* Thinking the other side of the question in the matter of "the modern mansion" might as well be set forth, I submit the following.—H. L. S.

ENGINEERING ITEMS.

Concrete.—The Royal Engineers have almost completed the 100-ton gun *emplacement* in the Government Marshes adjacent to the Royal Arsenal, Woolwich, the construction of which has been required for experiment prior to mounting the heavy guns of the same type in the fortifications at Gibraltar and Malta. The work, which covers an area of about 80 square feet, is composed principally of concrete in imitation of masonry.

Society of Engineers.—The members and associates of this society have visited the works of the London and South-Western Railway Company at Nine Elms. Mr. W. Adams, locomotive superintendent, received the visitors and conducted them over the works, and with him were Mr. W. Beattie, chief assistant to the locomotive superintendent; Mr. Mather, works manager; Mr. Brown, principal foreman of the carriage department; Mr. Sullivan, chief draughtsman; and Mr. Garrett, who has charge of the works alterations. The company visited the drawing-offices, the carriage-trimming department, the carriage-painting, boiler, machine, fitting, tyre, wood, and moulding shops. In the wood shop is a large circular saw, made without hammering, the speciality of the Lane Manufacturing Company, of America. This implement sawed through a log 15 ft. long and 15 in. thick in ten seconds. In the same department several machines by Ransome & Co., of Chelsea, for planing, sawing, slotting, &c., were exhibited. In the moulding shop the process of making moulds for axle-boxes with the machine of Butterfield & Co., of Keighley, was observed with much interest. About 1,500 workmen are employed at these works.

LIVERPOOL NEWS.

A New Roman Catholic Home for the Aged Poor.—The new home for aged poor people, near to the Church of St. Margaret, Belmont-road, was opened by Dr. O'Reilly, R.C. Bishop of Liverpool, on the 19th ult. The new building is from designs by Messrs. Goldie and Child, architects, London, and has been erected by Messrs. Holme & Nicol, the builders, Liverpool. The land, which is of considerable extent, has been paid for, but the building, erected at a cost of upwards of 9,000*l.*, has a debt upon it of about 5,000*l.* The new building (which is under the management of "The Little Sisters of the Poor") has at present sixty-four inmates, but there is sleeping accommodation for 100.

New Dock Works at the North End.—At a recent meeting of the Mersey Docks and Harbour Board, the minutes of the Works Committee contained a recommendation to proceed with the construction of the northernmost section of the new works at the north end, and to accept a tender for the excavation in connection therewith; but the consideration of the subject was adjourned.

The Junior Reform Club.—A temporary habitation for the members of this club has been provided in Eberle-street. The building is at present undergoing structural alteration at the hands of Messrs. Roberts & Robinson, of Liverpool, and will be ready for formal opening by Lord Northbrook on the 16th ult. Messrs. White & Son, of Duke-street, are doing the decorating, painting, and paperhanging work; Messrs. N. & T. Dutton, Great George-street, are supplying the furniture; Messrs. Ray & Miles, the carpets, &c.; and Messrs. Walker, Pendleton, & Co., Dale-street, the kitchen-ranges and stoves.

FROM SCOTLAND.

New Farm-steading at Troves, Elgin.—New farm-buildings have been erected on the farm of Troves, on the Fife estates, and about a mile to the south of Linkwood. Entering at the south gable, and passing through a large turnip store, the visitor finds himself in the feeding and cow byres, which are fitted up with all modern improvements. There is an entrance from the turnip-shed into the folds, and thus turnips can be conveyed to byres and folds without going outside. Next comes the men's sleeping apartment, which has good ventilation. The stable, which adjoins, contains six stalls. It is airy and well-lighted. After this comes the straw barn and threshing-mill, from which a stair leads up to a very commodious and well-ventilated grain loft. There is also an entrance to this loft from the north gable. The cart

shed follows, but an intervening passage, leading from the stackyard into the square, divides it from the barn. We now come to the principal fold for the rearing of fat stock. Immediately in front of the fold is an open cattle court. Here the main entrance to the square intervenes, to the left of which are another fold and open cattle court. The folds are covered with corrugated iron, but the rest of the steading is roofed with blue slate. The poultry yard lies to the east of the steading. There are also piggeries and a shed for holding farm implements. The architects were Messrs. A. & W. Reid, Elgin.

Aberdeen Hydropathic Establishment.—New buildings at the junction of Bridge-place, Bath-street, and Windmill Brae, intended for use as a *café* and hydropathic and Turkish bath establishment, have been erected. The building has a frontage of about 90 ft., and has five stories, the height from basement to roof being 72 ft., and to summit of tower, 80 ft. The baths department includes "cooling rooms," smoking-room, tepidarium, large plunge-bath (lined with Portland cement, and finished on the lower part with Torbay white naval enamelled paint, the upper part being lined with glazed tiles), and five smaller plunge baths. The walls of the various rooms in the two departments of the baths are of cement concrete, plastered with Portland cement, and finished with Parian cement, no lime plaster being used in the work at all. The woodwork is of pitch-pine, stop-chamfered and finished. The hydropathic portion of the building contains a number of large apartments. In the southern wing, immediately above the *café* dining-room, is the principal drawing-room, a lofty hall, lighted by three single and three double windows. Adjoining it is a ladies' drawing-room. The rest of the flat consists of bedrooms, a store-room, the resident physician's consulting-room, and the housekeeper's parlour, communication being established between this floor and the baths. The dining-room is the principal apartment on the second floor, occupying the southern wing, and designed to seat fifty persons. The arrangements for ventilating the rooms in this department of the building comprise circular gratings in the ceilings of all the apartments, communicating with shafts which unite and have their point of egress in the summit of the tower, where a Boyle's patent air-pump ventilator is fixed. Mr. D. Macandrew has been the architect of the building, and Mr. Winchester clerk of works; and the tradesmen were:—Masons, Messrs. P. Murray & Co.; carpenters, M'Robbie & Milne; slaters, M'Grigor & Shand; plumbers and gasfitters, Smith & M'Kenzie; plasterers, R. Henderson's Trustees; painters and glaziers, Gordon & Watt; heating engineer, John Taylor; bellhanging, &c., James Laing & Co.; lamps, W. Shirras & Son; encaustic flooring, &c., James Bannochie. Mr. Winchester was inspector of works; Mr. Murray, mason; and Mr. King, foreman carpenter.

Grangemouth Park.—At a special meeting of the Police Commissioners of Grangemouth, on the 17th ult., an offer from the Earl of Zetland of eight acres of ground for recreation purposes was laid before the meeting, and unanimously accepted by the Commissioners in behalf of the town. It was suggested that the park bear the name of either the Earl or the Countess, and be called the Lumley, Dundas, or Zetland Park.

BUILDINGS FOR POOR LAW ADMINISTRATION.

Fulham.—At a recent meeting of the Fulham Board of Guardians a long discussion took place respecting the instructions to be given to architects for preparations of plans, &c., and it was resolved that 100 guineas be awarded to the architect whose plan should be accepted by the Guardians, and 50 guineas to the architect who should stand second in the estimation of the Board, such plans to become the sole property of the Board.—On the motion of Mr. Pickersgill, seconded by Mr. Turner, it was decided to allow the architect of the new building 5 per cent. up to 20,000*l.* and 2½ per cent. on any outlay beyond that sum. Mr. Hunt, in reply to Mr. Thompson, who contended that 5 per cent. up to 10,000*l.* would meet the case, said that it was not always the lowest figure that turned out the cheapest, and he believed the higher figure would be more favourable to the Board in the end. The Clerk having remarked that it was usual in similar cases to appoint some one to supply the levels, Mr. Green moved and Mr. Cockerell seconded that Mr. Sanders, of King-street, supply the levels at a fee not exceeding 10 guineas. A discussion followed, some members contending that five guineas would be an ample fee, and others thinking that such matters should be left entirely in the hands of the architect; but ultimately Mr. Sanders was appointed at the fee originally proposed. The Clerk then, at the instance of the Board, went *seriatim* through a list of requirements to be submitted to the architects on behalf of the Board. The new building must afford accommodation for upwards of 360 cases, exclusive of separate arrangements for lock and other special cases. After considerable discussion it was resolved, "That an eminent architect (such architect to be a member of the Institute of British Architects) be called in to assist the Board in deciding how far the plans submitted conform to their requirements, and also as to their relative value."

Clerkenwell.—The Guardians of the Poor of the Holborn Union propose to erect a new infirmary on the site of the old Clerkenwell workhouse, King's-cross-road (formerly Coppice-row). The cost of the proposed buildings is estimated at 60,000*l.*

Mitcham.—At the meeting of the Holborn Guardians on the 18th ult., the tender of Messrs. May Brothers, of High Holborn, for the laundry works at the Mitcham Schools, for the sum of 1,260*l.*, was accepted. It was referred to a committee of the whole Board to meet Mr. Snell, the architect, and confer with him as to the erection of a new infirmary at the schools.

PROVINCIAL NEWS.

Reading.—At a special meeting of the Court of Governors of the Royal Berkshire Hospital, Reading, on the 3rd ult., the following proposals for providing additional accommodation were submitted by the board of management and the medical staff:—(1.) That the Nurses' Home be raised another story, to provide additional accommodation for nine private nurses and probationers, at an estimated cost of 1,700*l.* (2.) That an additional block be built on the south end of the Nurses' Home, for the accommodation of the housekeeper and twelve servants, at an estimated cost of 1,500*l.* (3.) That the laundry be erected at the south end of the proposed new dormitories, at an estimated cost of 1,500*l.* (4.) That the Nurses' Home, new dormitories, and laundry be connected with the main building by an inclosed way, to be carried along the south wall of the female convalescent ward, at an estimated cost of 500*l.* (5.) That the chapel be removed from its present position, and the side walls reduced in length to open out the quadrangle. The centre block of the hospital to be remodelled and extended. The present museum and library to be converted into a chapel, with operating-theatre and small ward over, at an estimated cost of 3,500*l.* (6.) That the out-patients' department be raised another story, to provide rooms for museum, library, and such other purposes as may be considered necessary, at an estimated cost of about 2,000*l.* (7.) That the kitchen be altered by having a lobby made at the entrance, and fitted with a ventilation-shaft, to prevent the smells of cooking, &c., from entering the wards, and the present laundry to be converted into a dining-hall for servants, at an estimated cost of 350*l.* Plans of the proposed new buildings and alterations were exhibited by Mr. Joseph Morris, the architect, and it was resolved to carry them into execution. The total estimated outlay is 11,000*l.*

Coggeshall.—A lych-gate has recently been erected at the principal entrance to the parish churchyard, as a memorial to the late Mrs. Bonton, the mother of the donors. It is executed in the style of the fifteenth century, and has been constructed in English oak, by Mr. C. H. Oldridge, of Colchester, from the designs and under the direction of Mr. E. J. Dampier, architect.

Bath.—On the 19th ult. Mr. S. J. Smith, C.E., one of the inspectors from the Local Government Board, held an inquiry in the Council Chamber, at the Guildhall, relative to the application of the town council (acting as the Urban Sanitary Authority) for the sanction of the Board to borrow 7,700*l.* for works of wood-paving. The surveyor (Mr. Parfitt), in answer to the question by the inspector, "What wood do you propose to lay down?" replied, "Archangel; that is the best material we can find, in my opinion." The inspector: You have selected good resinous, tough wood? The surveyor replied in the affirmative, and added, that it was intended to lay the blocks with open joints, filled with concrete and bituminous compound. The inspector, before closing the inquiry, pointed out the necessity there was for care in selecting the wood; that would be the greatest boon to themselves. The good or bad selection of material would make a difference of four or five, or even six or seven years, to the life of it. If they got soft pine-wood it would only have a short life. Doctors differ!

Stafford.—The corner-stone of the new butchers' market has been laid. The buildings are being erected from the plans of Mr. Joyce, which were selected in competition. Mr. Bridgett is the contractor.

Bilston.—A special meeting of the township commissioners was held on the 10th ult., to receive the sanction for, and to authorise the borrowing of, 1,500*l.* on the security of the General Improvement rate, and of 1,200*l.* on the security of the Free Library rate, and to give instructions as to the proposed Town Hall and Free Library extensions. The Chairman said he was pleased that the Local Government Board had sanctioned the proposed expenditure. At the recent Local Board inquiry an unexpected opposition sprang up, and much was said about the state of the town. Distant papers had also published articles referring to Bilston as a "doomed town," with its collieries worked or drowned out and its manufactories closed, but this was exaggeration. Better times were in store for the town, and as the extensions were greatly needed the sooner they were commenced the better it would be.

Dudley.—On the 23rd ult. the new Corporation baths erected at Dudley were opened by the mayor. Alderman W. North, the ex-mayor, gave a detailed account of the work of the Sanitary Committee, who had had the undertaking in hand. In the course of his remarks he stated that the contract for the building was a little over 4,000*l.*, the machinery would cost about 1,500*l*, the land was purchased for 600*l.*, and it was expected that the whole would be completed for 7,800*l.* or 8,000*l.* The Mayor having referred at some length to the various Acts of Parliament passed during the last thirty years for the sanitary improvement of the people, amongst which stood the Baths and Wash-houses Act, declared the baths opened. The baths are built of red brick, the front elevation being relieved by mouldings of a corresponding colour. There are three entrances leading directly to the private baths, sixteen in number; four first-class for ladies, and six first and six second-class for gentlemen. The swimming-bath is 104 ft. long in its total length, but it will be divided to afford accommodation for first and second class bathers. The breadth is 30 ft. and the depth ranges from 3 ft. 6 in. to 5 ft. 6 in., and the bath is capable of holding 88,000 gallons of water. The machinery is fixed in the rear of the baths, and includes a Davey's patent differential engine of nominally 40-horse power. Two Lancashire boilers, 20 ft. by 6 ft. 6 in., generate the steam both for the pumping-engine and for heating the water in the swimming-baths. The exhaust steam is conveyed to a Berryman's water-heater, whence it is forced by Pearn's quadruple-acting pump into the boilers and to supply the private baths. An iron tank has been placed on the top of the engine-house for holding a supply of water in case of any accident to the machinery. The pumps, which are particularly adapted for the work, are fixed in a shaft 120 yards deep, from which the supply of water for the baths is taken. Messrs. Davies & Middleton are the architects, and Messrs. Holland & Son the builders. The machinery was selected and laid down by Mr. Alexander Smith, C.E.

WESTMINSTER OFFICES COMPETITION.

We understand that the referee, Mr. Charles Barry, has made his report upon the designs submitted, and that it is now being printed, in order to be dealt with at a special vestry meeting to be held next week.

Surveyorships.—At a meeting of the Aldershott Local Board of Health, held on the 10th ult., Mr. W. L. Coulson was unanimously elected surveyor out of 108 candidates.

"FOOTINGS ON ANOTHER MAN'S LAND."

THE brief note which we appended to a letter under this heading seems to have surprised a number of persons, and we have received letters from several solicitors, amongst others, calling on us to justify the assertion we made. The following will serve to represent what they say:—

"Sir,—In the *Builder* of August 21st, page 249, appears a letter, headed 'Footings on another Man's Land.' You append a note at foot saying Building Bills have been before Parliament giving right to place footings on an adjoining owner's ground. Will you kindly inform me when these bills or acts were passed and where I can obtain a copy? because there is hardly a week passes that I have not disputes brought to me as to the encroachments of the footings, and in nearly all cases I say that according to common law no man has a right to place a single brick on the adjoining property without the consent of the owner.

HENRY W. MICHELL."

We said nothing about "Acts" or Bills passed. What we said was, "Building Bills which have been brought before Parliament have contained a clause giving right to a building owner to place footings on adjoining owner's ground." The Bill to which we more immediately referred was that prepared by the Metropolitan Board of Works and ordered by the House of Commons to be printed 20th March, 1874.

Part 4, Clause 24, sets forth how, where grounds of different owners adjoin and are unbuilt on at the line of junction, and the owner of one piece of ground is about to build thereon, he is to proceed; and thus concludes:—

"Where in either of the cases aforesaid the building-owner proceeds to build an external wall on his own ground, he shall have a right at his own expense at any time after the expiration of one month from the service of the notice, *to place on the ground of the adjoining owner the projecting footings of the external wall with concrete or other solid substructure thereunder*, making compensation to the adjoining owner or occupier for any damage occasioned thereby."

This Bill never became an Act.

We might have gone farther than we did in our note, and said that at one time it was the law of the land that a building owner might place his footings on the adjoining owner's property without his consent. For the benefit of our legal friends, some of whom seem a little behindhand in this matter, we will make this clear.

The Metropolitan Buildings Act, 7th and 8th Vic., cap. lxxxiv., sec. xxxviii. says,—

"And be it enacted, with regard to walls, so far as relates to the building thereof on vacant ground at the line of junction of premises belonging to different owners or in different occupations. That one month before the owner of any piece of vacant ground, or ground not hitherto built upon, shall build any building adjoining to another piece of vacant ground, or ground not hitherto built upon, or build a fence-wall for such piece of ground, it shall be his duty, and he is hereby required to give to the owner or occupier of such adjoining vacant ground a notice, which must be in writing, and must set forth his desire to build a party-wall or party-fence-wall, and describe the thicknesses and dimensions of such desired party-wall or party-fence-wall, according to the form (No. 16) in the schedule of notices, or to the like effect; and that if within such period of one month such adjoining owner shall signify his consent in writing, then the same must be built partly on the ground of one of the said owners or occupiers, and partly on the ground of the other owner, and such last-mentioned part is to be paid for as is hereinafter directed by such other owner or occupier; but if he do not signify such consent, then it shall be the duty of the building owner to build an external wall for such building, and fence-wall for such ground, entirely upon his own ground, *except as to the footings of any such wall.*"

We may therefore repeat what we originally said, and with an addition,—Building Bills which have been brought before Parliament have contained a clause giving right to a building owner to place footings on adjoining owner's ground; and at one time, viz., till the abrogation of the 7th and 8th of Victoria, cap. lxxxiv., this was the law in London.

English Cholera in Sandbach, Cheshire. Whether the cause be the impure condition of the water in the town and the district, or whether, as alleged by Dr. Davies, it is the result of neglect in the removal of nightsoil, the fact remains that in and around Sandbach, the *Warrington Guardian* says, the epidemic, which was reported in its columns a few weeks ago, has not abated in any degree. The Local Board, it is stated, seem fully alive to the urgency of providing an adequate and purer water supply, and have in view a scheme that will furnish Sandbach with all the blessings of a full and pure supply of water.

SEWAGE IRRIGATION.

Kidderminster.—At the last quarterly meeting of the Kidderminster Town Council a discussion took place with reference to a plan prepared by Mr. Pritchard, C.E., for draining the Sewage Farm.—Mr. H. Dixon, the Chairman of the Drainage and Waterworks Committee, read his report, which stated that subsequent to the visit of the members of the Town Council to the Sewage Farm, Mr. Pritchard, at their suggestion, prepared and sent in a modified scheme and plan for the drainage and distribution of the sewage, which could be carried out for a sum varying from 2,500*l.* to 2,800*l.* It was resolved to carry out the work.

Warwick.—On the 19th ult. Mr. Thornhill Harrison, C.E., one of the inspectors of the Local Government Board, held a public inquiry respecting an application by the Warwick Town Council for the Board's official sanction to a loan of 2,500*l.* The Town Clerk explained that the money was required for the sewage farm, the management of which had recently reverted to the council. There was no opposition.

AMERICAN NOTES.

A Town Burned Down.—Eureka, a mining town of Nevada, was almost entirely burnt down on the 17th ult. The loss is estimated at $1,000,000. This fire, following closely upon the severe fire which occurred last year, has considerably discouraged the inhabitants, who had scarcely finished their rebuilding.

A Big Blast.—A big blast at the Blue Tent diggings was fired off on July 2. The charge consisted of 1,542 kegs of powder, at 25 lb. to the keg, making in all 38,550 lb. The firing was done by electricity. The result was very successful. The bank, which is 238 ft. perpendicular, was torn away for about 150 ft. back, and 200 ft. wide. It is believed that this is the largest piece of ground torn from its foundation in one blast that has ever taken place in California.

Elevated Railway for Chicago.—The Metropolitan Elevated Railway Company of Chicago, with a capital stock of $5,000,000, has been licensed by the Secretary of State.

American Locomotives.—Advices from New York state that a large new locomotive, constructed by the Baldwin Locomotive Works, to be run on the Bound Brook branch of the Philadelphia and Reading railroad, and which has since the suspension of that company remained in the possession of its builders, has been purchased by Mr. F. W. Eames, of Watertown, New York, for brake trials and tests in England. It was to be fitted with the Eames duplex automatic vacuum brake and shipped to London. Mr. Eames proposes, while showing the action of the Eames brake on railway trains at the highest speed which it is possible to attain, at the same time to settle the vexed question of the relative superiority of American and English locomotives.

Proposed Colony of English Workmen.—It is stated that Mr. Thomas Hughes, Q.C., will, during his visit to the United States, lay the foundation of a new town in East Tennessee, where a colony for English workmen is to be established. The land is fertile, and the soil rich in minerals. An American paper suggests that it be called "Tombrown."

A Wonderful Gas-Well.—An occasional correspondent of the *Globe*, writing from Sheffield, Warren County, Penn., U.S., says:—The most wonderful part of Sheffield is a natural gas-well. The gas from this well is used in the furnace of the tannery of Horton, Crary, & Co., and runs the machinery; it also lights all the houses in the town, being brought in iron pipes two miles from the well. It was discovered in boring for petroleum. Escape pipes have been run up to a height of some 20 ft., and the huge flames from these pipes flare away day and night, and have done so for the last five years. The daily amount given off is estimated at 2,000,000 ft. The gas was found at a depth of 1,850 ft., and blew all the boring machinery out of the well. The pressure is so great when turned full on that the gas blows itself out. The smell is not the same as coal-gas, but more like petroleum. There is little doubt this gas-vein is on the edge of a petroleum field, or more probably all the land near is underlaid with it. The amount has not been found to lessen nor the pressure diminish in the whole five years.

New Colleges and Schools.—The executors of the late Alexander T. Stewart have appropriated sums, which will probably amount in the aggregate to $3,000,000, to the establishment at Garden City, Long Island, of a college for the education of young persons of both sexes at a charge of less than $100 a year, including travelling expenses from New York or Brooklyn. The first building, nearly complete, will accommodate 500 students. Two other buildings of equal dimensions will be erected beside it. A building, to accommodate 300 young women, occupying 25 acres, with annexes and surrounding grounds, will also be completed very soon. A divinity-school, to educate young men for the ministry of the Episcopal Church will also be established in Garden City.

CONTINENTAL ITEMS.

Observatory on Mount Etna.—Professor Silvestri, of Catania, says that in a short time the Observatory on Etna will be an accomplished fact. The Italian Government contributes half of the expenses, the Province of Catania a fourth, and the Commune of Catania the remaining fourth. The object of the Observatory is the study of vulcanology, and therefore it has been built at the base of the central cone, exactly on the former site of the well-known refuge called the "Casa degli Inglesi."

The Vieille Montagne Zinc Mines.—The general production of the Vieille Montagne Company's zinc mines last year was 65,839 tons, as compared with 75,955 tons in 1878. The production of galena effected by the company also declined to 5,907 tons last year, as compared with 6,499 tons in 1878. The reduction in the production indicated by these figures was effected voluntarily by the Sardinian and Algerian agencies, as in consequence of the low strength of the minerals obtained in those countries, and the difficulties attending their working, they do not yield any profit when prices fall below a certain point.

Communication with Belgium.—Sir Edward Watkin, Sir Henry Tufton, Mr. Myles Fenton, and Mr. Abernethy, C.E., of the South-Eastern Railway, have had an audience with the King of the Belgians, in reference to the construction of additional ports and harbours on the Medway and the Belgian coast, and the establishment of a fast and commodious line of steamers between the two countries.

Fire in St. Petersburg.—What is described as the most extensive fire that has occurred in St. Petersburg for the last seventeen years took place on the 16th ult., in the Ligofka quarter. More than twenty buildings were destroyed.

A large Lathe.—What is stated to be the largest lathe, not only in France, but in the world, has just been erected at the St. Chamond Steel Works, in the Department of the Loire. It is destined for the turning of 100-ton guns, and was supplied by Sir Joseph Whitworth & Co., of Manchester.

WATER SUPPLY.

Liverpool.—The Bill to enable the authorities of Liverpool to take a supply of water from the Severn has received the Royal Assent, and on the 9th ult. the Town Council resolved to proceed at once with the first section of the works. It is expected that the whole scheme will be carried out in five years, and will secure an additional supply of 13,000,000 gallons of water per day for Liverpool. Mr. Wilson, chairman of the Water Committee, remarked that the Bill provided for Liverpool a *minimum* quantity of forty gallons daily per head, and it enabled the corporation to sell water to their neighbours at a fair price. What, however, was of great importance was that the corporation had power ultimately to retain the whole water supply, the condition being that five years' notice to discontinue can be given when only thirty gallons per head are available for increased population. The only payments to which the corporation were committed were to the various interests on the Severn, 30,500*l.*, and to other petitioners for legal expenses some 1,400*l.* The engineers had confidence that the estimates submitted to the council would be ample to carry out the work. They would be increased to the extent of 25,000*l.*, owing to the additional height of the embankment at the Vyrnwy necessary to meet the increased compensation water to be given to the Severn. No amount had been included in the engineer's estimate for the purchase of

the watershed, but about 8,000 acres had been acquired for 61,000*l.*: and if the remainder of the shed round the lake could be bought it would insure the absolute purity of the water for all time. Manchester had wisely acquired the watershed at Thirlmere, and it was to be hoped the same thing would be done by Liverpool at Vyrnwy.

Llandudno.—The new Llandudno Waterworks, opened by the Prince of Wales a short time since, draw their supply from two lakes, Dulyn and Melynllyn, having an acreage of 32 and 18 acres respectively, in the Snowdonian range, and distant from Llandudno about fifteen miles. The report of Professor Frankland respecting the Dulyn water says, "For the supply of a town it is fully equal to the celebrated Loch Katrine water." The lake being 1,700 ft. above the average level of the town of Llandudno, there is no apprehension as to the flow by gravitation. The second lake (Melynllyn) is secured mainly for supplying the compensation-water stipulated in the Act of 1876. The first four miles of pipes from Dulyn to the service-reservoir are 15 in. in diameter, and, with the exception of valley crossings, are of earthenware pipes. These are laid at easy gradients, and are not under pressure. The valley crossings are provided with wash-out branches and valves. Manholes and ventilators are provided at suitable points for examination and ventilation. The 15-in. conduit-pipes are capable of delivering a sufficient quantity of water to supply the maximum summer population of Llandudno when it is double the present number of 12,000. The pipe-line from the service-reservoir to the town of Llandudno is twelve miles in length, and the pipes are 9 in. in diameter. These are laid in duplicate under the bed of the river Conway, with valve arrangements to use either of the two lines at will. The whole system is provided with sluice, air, and wash-out valves at appropriate places. The scheme authorised by the Act of 1876 included two service-reservoirs, one at Llwyngwaew, four miles from the lakes, and the other at Bryn Gosol, about two miles from Llandudno; but for the present it is considered that the existing service-reservoirs in the town are sufficient, and therefore the cost of constructing the proposed reservoir at Bryn Gosol is saved. The service-reservoir at Llwyngwaew is 535 ft. above the level of the sea. It is constructed of brickwork, backed with concrete. The earthenware conduit terminates, and the pipe-line commences there. There is a by-pass arrangement, so that water can flow direct from Dulyn to the town, while the reservoir is empty for cleaning, repairs, or otherwise. The total cost of the works when completed, including the purchase of lands and easements, is estimated at 40,000*l.* Mr. T. T. Marks, C.E., engineer to the Llandudno Improvement Commissioners, is the author of the scheme.

South Staffordshire.—New works belonging to the South Staffordshire Waterworks Company have been inaugurated. In consequence of applications for the supply of water for domestic and manufacturing purposes, the attention of the directors was in 1873 directed to the water which was being liberated in such abundance by the trial sinking for coal by the Cannock and Huntington Colliery Company at Huntington, and the water was reported upon so favourably by Dr. Hill that in the summer of 1874 the directors decided to make Huntington the site of a new pumping-station. Dr. Hill subsequently reported still more favourably of the Hednesford or Rugeley water, and his analyses were at a later period confirmed by Professor Voelcker; whilst the difficulty experienced by the colliery companies in keeping down the water in their sinkings, and the opinion of Professor Ramsey, justified this company in anticipating an abundant supply. A Bill was therefore obtained in 1875, and arrangements were made for erecting two pumping-stations, one at Huntington, and the other about three miles and a half away, on the side of the main road leading from Hednesford to Rugeley, with a capacious reservoir on the summit of one of the highest hills above Hednesford. The contracts for the engine-houses and buildings were taken by Messrs. Trow, of Wednesbury; that for the engines by Messrs. James Watt & Co., of Soho; and that for the reservoir, which is known as the Scout House Reservoir; and for the laying of the pipes and mains, by Mr. Joseph Walker, of Crewe. These stations were completed about twelve months ago, but owing to the bad weather which prevailed last year the formal inauguration of the extension works was deferred from time to time, and at last postponed until this year. The Huntington pumping-station consists of a Gothic building, of red brick with stone dressings, erected from the designs of Mr. Naden, architect, Birmingham, and it contains two powerful single-action Cornish engines of 165-horse power nominal, working up to perhaps 300-horse power, with a well-pump of 21¼ in. diameter, and a 10 ft. stroke, the quantity of water raised at each lift being something like 340 gallons. Each engine is capable of raising 2¼ million gallons in twenty-four hours, or a total of five millions from this station, and a like quantity can be raised from the one at Hednesford. Leaving out of account the older engines at Lichfield, which can raise six or seven million gallons a day, this yield is nearly double the present daily demand upon the company's resources. The water is pumped direct from underground springs in the conglomerate or pebble-bed formation, a subdivision of the new red sandstone rocks, and is carried by mains to Cannock, where, at about the centre of the Market-place, it joins the supply sent down from the Hednesford station, and if there should be a demand for the water, the united streams flow on by mains altogether independent of the old system along the high road through Bloxwich to Walsall and the Black Country, being kept distinct from the Lichfield water until Wednesbury is reached. The surplus water flows back from the point of junction at Cannock to the Scout Hill Reservoir. The Hednesford Station is in arrangement and construction almost a counterpart of the other, the engines being duplicates of those at Huntington; and here, as there, cottages of picturesque design, harmonising with the pumping-houses, have been provided as residences for the engineers and their families, which, paved throughout, covers sixteen acres, and contains when full about 42,000,000 gallons of water. The company has now spent 720,000*l.* on the works, the extensions under notice, with some minor ones elsewhere, having absorbed 313,000*l.* The late Mr. J. R. McClean, M.P., was the engineer.

Littlehampton.—On the 14th ult. the Duke and Duchess of Norfolk visited Littlehampton, and laid the foundation-stone of the new water-tower, in connexion with the extensive new waterworks, which are in process of completion. The Local Board, acting under the advice of Mr. R. B. Grantham, their engineer, have bored and excavated till they have obtained a supply estimated to yield 168,000 gallons per day; and, Littlehampton being built on a dead level, a tower was found necessary to distribute the water over the district. The storage capacity of the proposed tower will be 80,000 gallons; and the estimated cost of the entire works is 11,000*l.*

Dundalk.—A public meeting of the ratepayers of Dundalk was held on the 19th ult. for the purpose of obtaining their sanction to the proposed scheme of having waterworks constructed to furnish the town with a supply of pure water, the sanitary authorities having condemned the present supply as inadequate and impure. It was understood that a committee of six, composed of the largest ratepayers in the town, would be asked to assist the Town Commissioners in carrying the matter into execution.

Evesham.—At the quarterly meeting of the Evesham Town Council, a few days ago, the Sanitary Committee reported that the scheme of a supply from the property of Colonel Davies, of Elmley Castle, could not possibly be entertained, the engineer to that gentleman having sent in conditions which rendered it impracticable,—requiring, among other things, that the villages of Elmley Castle, Netherton, &c., should be supplied at cost price, the Corporation laying down pipes, and also that Colonel Davies should have a right of supply for ornamental purposes; and further, if the supply should fail, or other necessity for the abandonment of the work should arise, the whole of the plant should remain upon the estate. These conditions, Councillor New said, rendered it necessary for them to look out for another scheme. The Sanitary Committee were deputed to consider and report upon a scheme for taking a supply from the Avon. The cost of such a scheme was estimated at 16,000*l.*

Telephony.—The authorities at Newcastle have agreed to allow the United Telephone Companies to lay underground wires for telephonic purposes.

LONDON WATER-SUPPLY.

SIR,—Perhaps you will pardon my addressing a letter attempting to introduce a suggestion on so important a matter as that of the London water-supply. Taking it that there will be no dissentients to the holding of the Select Committee that "the supply of water to the Metropolis should be placed under the control of some public body which shall represent the interest and command the confidence of the water consumers," I think this might be attained without the introduction of an entirely new supply from one gigantic source, and without the removal of the existing companies, by a method of subsidising these companies from a new source or new sources of supply. According to this method, the body of control would bring in fresh supplies of water and deliver them to the companies to be distributed by them, and would also introduce water where they could not readily do so. The companies have the means of distributing to a large extent, and could increase their distributing facilities to suit the public demand. Were they supplied abundantly, and a copious filling in where there was a deficiency in any square of the area made, the Metropolis would be well provided with water. How many million gallons above their present run each company would require, what additional mains would be necessary to make the whole circle of supply complete and ample, and how much each company would have to pay for this assistance, would have to be regulated from the statistics and the plans of the city. A word might also have to be spoken by Parliament with regard to the maximum rate at which the commonalty should be supplied with a certain minimum of water, regulated by the size of the bore of the tap through which it flowed. Where a large supply of water is required it must be paid for always accordingly. W. Y. B.

P.S.—In Glasgow, when the Loch Katrine water was introduced, all the machinery for bringing water from the river Clyde was removed. The corporation now find it requisite to restore the machinery for pumping from the Clyde. It is not always advisable to make a clean sweep.

PITCH-PINE: WOOD FOR WINDOW-CILLS.

SIR,—Your correspondent "Pinus" desires further information about pitch-pine than has already been given by "A Civil Engineer." The following is at your service.

When I first used pitch-pine I formed a similar opinion as to its capabilities to that of "Pinus," but after a few years I found, on taking out some sash-frames which were but lately inserted in the building, that the cills were quite decayed, and also that the paint had not adhered to them as it had to the other portions of the frames. I have since had to use it for cills, when specified, but am so dissatisfied with its behaviour that I have not done so of my own accord for many years, considering Memel, or what we call Petersburg red deal, to be much more durable. Some kinds of imported oak (American red, for instance) I have found to be less durable than the red deal, though from the scarcity of English oak imported timber has frequently to be used for cills. An experience of forty years has caused me to form a similar opinion to that of "A Civil Engineer" as to pitch-pine,—its liability to decay quickly when exposed to damp, its tendency to twist in framing, and to shrink in all, or nearly all, situations when used in any but narrow widths. It is also inferior to Memel when exposed to transverse strains, as it snaps short with but little warning when overweighted; whilst Memel deflects considerably before breaking, and its fracture is not so short as pitch-pine.

AN OLD CARPENTER.

SIR,—I have been requested to give my experience of the different woods available and suitable for the cills of window-frames.

I prefer to class them as I consider they stand, viz., oak, chestnut, pitch-pine, Dantzic, and Memel fir. Oak is, doubtless, the most durable, but as it would be too expensive a matter to construct frames entirely of this material generally, and fir being the class of wood well-adapted to the upper portion of frames, and, beside being the cheapest article, is not so subject to warp, some suitable wood should be chosen for the cill. From my experience of the effects of oak on fir, when both are framed together, and the

oak has the slightest chance of imbibing moisture, and of thus imparting its tannin to the fir, I should by no means use it for window-cills; but for door-cills, it is quite another matter, for the wear of the cill will bring about an equal necessity for a new cill, and, partially from decay, new posts. Chestnut, well seasoned, would be decidedly preferable to oak for window-cills, being less likely to warp, less detrimental to fir, and if kept fairly free from wet, a most durable wood. But when we find that with our hard wood (I mean of English growth) fir is somewhat out of place, and fir being the material most used, both for its cheapness, abundance, and ease of working, we should try and find a wood which will by its nature agree with fir, and yet by its inherent strength and quality resist unnecessary wet, and these, it seems to me unite in pitch-pine. This wood seems to me to have been given to us by a wise Providence, not to be wasted, but to be wisely and judiciously used. I have used it for fifteen years, when I could persuade architects to allow me, and can bear witness to its quality; for what is most destructive to many other woods is simply a necessity to this,—I mean dampness, or, rather, wetness,—and that which Baltic fir most needs pitch-pine is most ready to part with, viz., resin, and thus a balance of supply and demand is kept up, and the work is preserved; but I think we ought by no means to despise either Dantzic or Memel fir for window-cills. Both classes of wood contain strong resinous qualities, and this fits them admirably for window-cills, or cills of heavy wood structures; but if I were called upon to decide in this matter, I should choose pitch-pine, both for its cheapness and durability, and also for its natural agreement with the poorer qualities of fir. But I hope that I shall not be understood to be an advocate for pitch-pine for all constructive purposes. Let it be plainly understood that this wood requires a certain amount of feeding either with oil or water; and if neither of these is supplied, and especially if fresh air is withheld from it, it will live upon itself, and, I should think, rapidly decay; and here I may remark that if architects would so arrange the ends of heavy timbers that free ventilation is allowed all round, they would save the annoyance of finding heavy floors subsiding, and main timbers rapidly decaying.

W. B. F.

SIR,—As a result of eight years' experience in the building trade in America, I have found that pitch-pine, when used in external work, will last but few years. Yellow pine, or, as it is called there, white pine, is almost universally used for window-cills and all work exposed to the weather,—of course, being kept well painted. Pitch-pine in the Southern States, where it is cheaper than other varieties, is used for flooring and bearing timber, as joists, rafters, &c.

SAML. BLAND.

SIR,—Twenty years ago I bought my first dry pitch-pine plank, and it had gone rotten at the end while standing to dry. Since then I have bought many thousands, but if ever I buy them dry, there are pretty sure to be some rotten on the face, where they have been piled without slips between. I believe any timber-merchant who deals in it will verify this; and the fact that it is nearly always stored *under cover* is another proof of its being unfitted for outdoor work.

One of your correspondents speaks of the large amount of resin, &c., it contains, as being proof of its enduring qualities; but if this is so, how comes it that the best methods of preserving timber proceed on the basis of forcing out the natural juices, and filling the pores with tar, creosote, &c.?

G. M. H.

RAILWAY CATASTROPHES AND WORKMEN'S EDUCATION.

SIR,—In your issue of Aug. 21 (p. 225), under this heading, you again call attention to the necessity there is for extension in the technical or practical education of working men by means of text-books *for each trade*.

I was about to address the engineering papers in connexion with the two recent railway accidents, and to specially mention what I may be allowed to say here.

While in charge of an Eastern Colonial line of railway, I caused to be placed in the hands of every responsible working man, *i.e.*, those in charge of a gang of repairers, a tabulated form, showing position, radius, super-elevation for outer rail, gauge of different curves, inclination of road, &c., with special instructions as to lifting, packing, strengthening, &c., during traffic. I also gave them instructions on the ground on my regular visits to each gang,—visits being by walking, and not by flying past on a trolley, or upon an engine, or in a van. Each bridge was specially cared for much after the same way.

With regard to the drivers, the only information they have about the road is that of the inclination which is painted by the roadside, and seldom noticed after the first few runs.

Engine-drivers as well as repairers ought to have every information possible in their possession regarding the construction of the road, and the latter ought to be visited oftener, and in very different manner from the present, by their immediate superiors. In my opinion more knowledge of the way of keeping the road in repair would have prevented both accidents alluded to.

JAS. DOUGLASS.

SERPENTINE.

SIR,—Referring to the notice of business premises in your paper of the 31st of July last, we shall be glad if you will permit us to state that the information you received on the premises, that the columns and pilasters referred to were of Devonshire marble, is not precisely correct. They were supplied from the Serpentine Quarries at Poltesco, near the Lizard.

CLARK & Co.,
Contractors for the Shop Front.

DRAINAGE IN TOTTENHAM AND NEIGHBOURHOOD.

SIR,—I am not a constant reader of the *Builder*, but I was very glad when a friend drew my attention to the correspondence which has appeared in your paper on the above subject. The grievance of the influx of sewage and storm-water in times of heavy rainfall extends as far as Enfield, and I regret to add that my tenants have been greatly inconvenienced thereby. I can fully bear out the testimony of Mr. A. R. Brede (whose letter you published June 26), who states that every storm renders the lower part of the houses uninhabitable, and the water and filth spoil everything. It is really a very heavy loss to the owners of the property thus inundated.

I shall be very glad to be in communication with Messrs. Smith, Webber, and Brede, who have, like myself, had correspondence with the Local Board of Health, and I shall be very glad for any advice and suggestion on the subject. I hope you will be good enough to insert this letter, and that soon we may have the names of other sufferers.

H. B. P.

CHURCH-BUILDING NEWS.

Whittle-le-Woods (near Chorley).—The foundation-stone of St. John's Church was laid by Colonel Crosse, of Shaw Hill, on the 31st of July. The church is in the Early English style, and comprises: nave, 82 ft. long by 32 ft. 6 in. wide, and 45 ft. high; south aisle, 82 ft. long by 13 ft. 6 in. wide, and 30 ft. high; north transept, 19 ft. 9 in. long by 30 ft. 9 in. wide, the roof intercepting with the nave. The chancel will have an octagonal apse, 37 ft. 9 in. by 25 ft. by 32 ft., and will accommodate a choir of forty. The organ-chamber will be 15 ft. by 15 ft., and 30 ft. high, and the vestry under the tower 15 ft. by 15 ft., and 19 ft. 6 in. high. In the area of the church accommodation will be provided for 572 persons. Adjoining the north transept a lofty tower will be erected, to contain a peal of eight bells. The internal dimensions of the tower will be 15 ft. by 15 ft., and 90 ft. high. The belfry and portions of the tower above the ringer's room are not included in the present contract. The nave will be divided from the south aisle by an arcade of five bays, having pillars with enriched carved and moulded caps and bases and moulded arches. All the roofs are open, with carved and moulded principals. The whole of the work has been designed by Messrs. Myres, Veevers, & Myres, architects, Preston, who are carrying out the work. The contractors for the work are the Victoria Timber Company, Chorley, the amount of their contract being 5,428*l*. Mr. John Bowen is acting as clerk of works.

Beverley.—On the 3rd ult., the new church erected in Holmechurch-lane, Beverley, on the site of the old parish church, was consecrated by the Archbishop of York. The building has been erected under the will of the late Lord Wolverton in memory of his son, the Hon. Richard Riversdale Glyn, who was born in 1831, and died in 1859 while returning from India, where he had been engaged with the forces all through the Mutiny, and was buried at Aden. The style is Geometrical, or Early Decorated, and the tower when finished will have a peal of bells. The church comprises a nave 70 ft. long by 23 ft. wide and 47 ft. high to the ridge, a chancel 25 ft. by 23 ft. wide, a porch, organ-chamber, and choir-vestry on the south side. The tower is 19 ft. square, 94 ft. high, and rises at the south-west angle. The building is erected of Bradford stone, with Whitby Crag Moor stone dressings to the window tracery, cills, copings, &c. The interior of the walls is lined with red stock bricks. Messrs. Simpson & Malone, of Hull, and Mr. Elwell, of Beverley, are the contractors. The design of the building is by Messrs. Smith & Brodrick, architects, Hull, who have superintended the erection of the church. Accommodation is provided for a total of 360 persons.

Erlestoke.—A new church has been built at Erlestoke. It is Gothic in style, and has been erected from plans by Mr. Street, R.A. On plan the building consists of a nave, north aisle, chancel, south transept, vestry, tower, and porch. The nave measures 48 ft. by a little over 21 ft. wide, and the chancel is 26 ft. by 17 ft. 6 in.,—making a total length of 74 ft. The height of the tower is 45 ft. to the line of its parapet, and it is surmounted by a sharp-pitched roof. The whole of the roofs generally are covered in with plain red tiles, made by Mr. Box, of Market Lavington, surmounted by crestings, by Cooper, of Maidenhead. The building is built of Box Ground stone throughout,—not only in the dressings but the walling as well,—all the Box stone, after being faced up, is left "batted" from the tool; and in no instance is it "dragged" or rasped up to an affected smooth surface, as is the usual treatment in "soft" stone masonry. The interior walls, like those outside, are all of solid Box Ground stone, tooled over. The roofs throughout,—with the exception of that of the organ-chamber and north aisle, which is flat panelled, divided by longitudinal and transverse moulded ribs,—are open, and of Memel fir. The nave roof is divided into four bays, with moulded and carved and embattled bracketted hammer beams, supporting principals with curved braces and purlins. The principals rest upon stone corbels. The chancel roof is divided into four smaller bays; the principals with their curved ribs abutting on to the wall plates. There is a rise of five steps from the chancel to the altar. The chancel floors are laid with Godwin's encaustic tiles of ornamental design. The steps are of polished Pennant stone, with tiled risers, and the floors of the church generally are laid with Mr. William White, F.S.A.'s, patent Blockwood flooring. This has been put down by Mr. Gregory, of Clapham Junction. The font is of Corsham stone; it is octagonal in plan, richly moulded on all the canto. It stands upon a polished sub-base and step of Pennant stone. The old oak Jacobean pulpit has been utilised again, placed upon a Pennant base. The chancel fittings are of oak, and the body of the church is seated with pitch-pine. It is heated by Messrs. Jones & Son's (of Bankside, London) system of hot-air. The carved work has been executed by Mr. Harry Hems, of Exeter. The builders are Messrs. Hale & Son, of Salisbury, and their managing foreman on the spot was Mr. William Cowley. Mr. Street has been represented by Mr. Thomas Chapelow, his clerk of works. The cost of the church is rather over 6,000*l*., and it is anticipated that it will be opened in September. A new parsonage has been built also from Mr. Street's designs, and by the same contractors.

Marston.—Marston parish church, near Grantham, was re-opened on the 3rd ult. by the Bishop of Lincoln, after restoration. When the rector, the Rev. H. B. Thorold, first undertook to restore the chancel, nearly three years ago, the roof was flat, the east window of the south aisle was partly blocked by a brick-vault, and light was introduced into the nave by a dormer window. The rector's example was followed by, so far as the vertical line is concerned, Sir J. H. Thorold, Bart., who undertook the restoration of the chancel arch and gable over it, together with the Thorold Chapel. The Bishop of Rochester (Dr. Anthony Thorold) contributed the stained glass in the east window, as well as a sum for providing a pulpit and reading-desk and the Dowager Lady Thorold; and other members of the family, by the insertion of painted windows and in other ways, have done their part. The new chancel, built on the foundation of the old, is an example of the fullest development of the Early English style. The stained glass is by Messrs. Ward & Hughes, of London, and the pavement by Messrs. Minton & Hollins. The tower and spire are of Early Decorated work. The south aisle, also of the Decorated period, has been rebuilt and re-roofed, and in connection with it may be remarked the perforated spandrils of the arches on that side of the nave, believed to be unique. The works have been carried out by Messrs. Rudd & Son, of Grantham, from the designs

and under the direction of Messrs. Kirk & Sons, of Sleaford, at a total cost of about 2,000*l.*

Swansea.—On the 5th ult. was laid the foundation-stone of St. John's Church, Gower-road, near Swansea, Mr. John T. D. Llewelyn, of Penllergare, on behalf of himself and father, gave the site for the church (about one acre in extent), and 1,000*l.* towards its construction. The church is to contain 300 sittings. Its estimated cost, with schools, is 2,900*l.* of which sum 1,550*l.* is still required. The architect is Mr. J. B. Fowler, of Brecon, and the contractors are Messrs. Thomas, Watkins & Jenkins, of Swansea.

Culworth.—The parish church of Culworth has been re-opened, after restoration. The church is dedicated to the Blessed Virgin, and consists of a chancel, with vestry attached, nave, and side aisles, and tower containing five bells and a clock. The church was partially restored at considerable expense by the late rector, the Rev. John Spence, and about four years ago it was determined to complete the work then begun, including the restoration of the tower, the reseating of the interior, the building of a new organ-chamber, the removal of the galleries, the opening up of the tower, the insertion of three new windows, the warming and lighting of the church, and the rehanging of the bells. The estimated cost for this was 1,145*l.* A piece of ground, given by the rector, has just been added to the churchyard, and enclosed with a stone wall by the parishioners, at a cost of 105*l.* Sufficient funds having been raised to warrant a commencement of the work, the services of Mr. E. F. Law, architect, Northampton, were retained, and under his directions Mr. Cotterell, builder, of Culworth, proceeded with the work of restoration, which has now been completed. The north aisle has been lengthened, and an organ-chamber constructed at the east end; the galleries beneath the tower have been removed, and the tower opened up; the old high-back pews have been converted into open seats; new choir-stalls have been placed in the chancel; and the whole of the stonework, which was formerly painted and bedaubed with whitewash, has been scraped and cleaned, and restored to its natural colour. Mr. Cotterell, the builder, has, at his own cost, inserted a small stained-glass window at the west end, representing the Virgin and Child, in memory of his father and mother. The window was painted by Moore & Co., of London. Under the organ-chamber a new heating-apparatus has been put in by Haden & Son, of Trowbridge. The whole of the carving has been executed by Mr. Phillips, of Northampton.

DISSENTING CHURCH-BUILDING NEWS.

St. Austell.—The Congregational Church at St. Austell has been re-opened, after restoration from plans by Mr. S. Trevail, architect, the contractor being Mr. Thomas J. Smith, of St. Austell. The organ has been re-erected by Mr. George Tucker, of the Octagon Works, Plymouth. The whole of the plumbing work has been carried out by Mr. W. Hawke, of St. Austell. The cost of the entire work amounts to 350*l.*

Newcastle-on-Tyne.—Trinity Presbyterian Church has been re-opened, after alterations and re-decoration. The various works in the church, and in the hall beneath it, and the painting and decorating, have been carried out in a satisfactory manner by Messrs. Copland & Rollo, Northumberland-street, and Mr. James Smart, Stamfordham-place, under the direction and superintendence of Mr. J. J. Lish, architect.

Poole.—On the 18th ult., a new Wesleyan church, built at a cost of 4,000*l.*, was opened at Poole. The architect is Mr. Charles Bell, of London, and the builder was Mr. Clarke, of Parkstone. The building, which will seat 950 persons, is in the Geometric style of Gothic architecture, and is built of Swanage stone, with Bath stone dressings. The main gable faces the High-street. A tower, about 100 ft. in height, is built at the angle of Chapel-lane and High-street, surmounted by a spire. The chapel is divided into a wide nave, with side-aisles, by arcades, supported by polished Shap granite columns, with carved capitals and bases. The pulpit was carved by Mr. Hems, of Exeter. It is of Bath stone, and consists of a projecting half-octagon centre, with side-wings, the stairs being behind. The front is arcaded, with polished Devonshire marble shafts, and enriched with a carved cornice. In the centre panel is a carving of the Transfiguration, and on the two sides emblems of St. Mark and St. John; whilst in the panels of the returns are an open Bible and emblem of the Trinity, and the head of the Rev. John Wesley, grandfather of the founder of Wesleyanism, who, ejected from the Established Church by the Act of Uniformity in 1662, became a Nonconformist minister in the town. The gas coronæ and the hot-water heating-apparatus have been executed by Messrs. Joyner, of Poole. The end window is the work of Mr. T. Cox, of Southampton-row, and the general glazing by Messrs. Brown & Boreham, of London. The general carving has been executed by Mr. Grassby, of Dorchester.

Peckham.—A new chapel and schools for the Unitarian body is about to be erected in Avondale-road, Peckham, from designs by Mr. Bruce, architect, Dulwich.

Rushden.—The Succoth Baptist Chapel has been re-opened, after renovated and re-seating. Mr. J. Bayes, of Higham Ferrers, did the mason work and plastering; Mr. S. Knight, jun., Rushden, the carpenter's work; and Mr. J. Margetts, also of Rushden, the painting and decoration.

Statistics of Wesleyan Chapel Building.—At the recent Wesleyan Conference, the Revs. Edwin H. Tindall and Henry J. Pope (Manchester), the general secretaries, presented the report of the Chapel Committee. Under the building department there are two classes of cases, erections and enlargements sanctioned during the year, and erections completed which had been sanctioned in previous years. The following erections and enlargements have been sanctioned:—

101	Chapels, at an estimated cost of	£139,604
15	Ministers' houses	11,969
19	School-rooms	7,194
88	Alterations and enlargements	52,233
97	Modification of cases (additional)	3,720
23	Organs	6,935
341	cases. Outlay.....	£253,655

Of the proposed new chapels, 68, to accommodate 15,253 hearers, are to be erected in places where there were previously no Wesleyan Methodist chapels; and 39, estimated to provide accommodation for 13,978 hearers, are to supersede former erections reported as having provided 7,775 sittings. Three chapels are intended to provide 123 sittings less than the former buildings. The total accommodation to be provided in the proposed new chapels is, therefore, 21,456 sittings. Under the head erections completed during the year, the following cases have been reported:—

126	Chapels, at a total cost of	£215,415
13	Ministers' houses	11,988
20	School-rooms	17,658
96	Alterations and enlargements	58,256
44	Organs	13,858
297	cases. Total outlay	£318,175

Towards this outlay there has been actually raised by voluntary contributions 215,871*l.*, to which must be added grants, from connexional funds and other sources, of 21,594*l.*, being a total of 237,455*l.* actually raised. The average cost per sitting in the 126 new chapels is 5*l.* 17*s.* 9½*d.*

SCHOOL-BOARD SCHOOLS.

Plymouth.—New buildings, erected by the Plymouth School Board, were lately opened. The schools are comprised in a block of buildings measuring about 180 ft. long by 60 ft. deep, and divided into two separate departments for girls and infants. Entering the block by the higher door, the infant department is reached, and to the right there is a suite of four class-rooms, measuring respectively—one 23 ft. by 13 ft., two 18 ft. by 13 ft. 6 in., and another 26 ft. by 13 ft. 6 in.,—fitted up with galleries or desks for the varying ages of the children. To the left of the main passage-way there is cloak-room and lavatory accommodation, the former being arranged with separate doors for ingress and egress, and fitted with wrought-iron hat and cloak hooks, and the latter with Messrs. W. Macfarlane & Co.'s patent lavatory basins, with water laid on from the town mains. To the left is the main infant school, which measures 42 ft. by 22 ft., exclusive of the main gallery recess, 18 ft. 6 in. by 8 ft., and is 20 ft. high to the under-side of the ceiling. The doorway at the end of this room leads to the two teachers' rooms, each 14 ft. by 10 ft. 3 in., fitted with lavatories, cupboards, and other conveniences. This, the infants' portion of the buildings, is of a single story,—the other portions are of two stories. Passing from the teachers' rooms by a short staircase, which forms the line of internal communication from end to end of the entire building, the junior girls' school-room is entered on the ground-floor; it measures 42 ft. by 20 ft., by 15 ft. high. Above this is a senior girls' school-room, of the same dimensions, and 16 ft. high to the under-side of the ceiling. The junior girls' class-rooms measure each 21 ft. by 18 ft., and they are of the same height as the main school-room. Opening out of the main entrance to the girls' school are cloak-rooms, and a doorway leading to the yards. Opposite the main entrance door a staircase communicates with the upper floor, which comprises the senior girls' department, and is similar in area and arrangement to that of the juniors below, excepting that a mezzanine floor occurs over the cloak-rooms, in which there is lavatory and cupboard accommodation. The heating is by open fire-places, and "Tobin's" system has been adopted for ventilation. Internally the walls are dadoed in pitch-pine to the height of the window-sills, and the main timbers of the roof are left open and varnished. Externally the treatment has been that of the Early Domestic Gothic in style. The walls are of blue limestone, with dressings of the same material of a pinkish tint for the sake of contrast. The roofing is of Delabole slate, relieved by fancy cut bands, and is surmounted by a wooden bell-cote rising about 30 ft. above the ridge-line. The playgrounds at the back and end cover an area of about 6,500 superficial feet, and have covered ways and play-sheds. A total school and class-room accommodation is provided for 673 children. The architect is Mr. S. Trevail (whose plans were selected in competition), and the contractors were Messrs. Lethbridge & Foot.

Brightside (Sheffield).—The new schools at Brightside have been opened. They were erected from the designs of Mr. E. R. Robson, F.S.A. The building has not yet an infants' department, though one will be added almost immediately. The building as it now stands, therefore, has only two stories, and it is so planned that one floor can be used for boys and the other for girls, or both floors can be used as a mixed school. The top floor has a duplicated staircase for the sexes. Each floor consists of five rooms, capable of accommodating sixty children in each room, or 600 children in the schools as they now stand. The schools are arranged on the German system of class subdivision so far as is consistent with the system approved of in English elementary schools. The block of buildings in the rear is so contrived that the space is utilised by a mezzanine story, in which cloak-rooms and teachers' rooms are provided. The style of the building may be considered as an adaptation of that prevalent in England during the latter half of the seventeenth century. Messrs. Chambers & Sons are the builders, and Mr. J. Laidler is the clerk of the works. Mr. S. Cole, chairman of the School Board, who presided over the opening ceremony, said the school in which they were assembled was built upon the largest site yet obtained by the Board. It had cost 2,000*l.*, and the total cost of the building and furniture, &c., had been 6,000*l.* additional. For the information of those who had not already seen them he would quote a few statistics about education. It was estimated in 1870 that provision would be required for the education of 300,000 children, but Lord George Hamilton has estimated it at a million and a half. That statement even was found to be below the truth. In 1870 the children in England and Wales upon the school register numbered 2,017,000, whilst in 1879 they numbered 3,710,000, or an increase in nine years of 1,693,000 or 119 per cent. The average attendance in 1870 was 1,152,000; in 1874 it was 1,679,000; and in 1879 it had risen to 2,595,000, being an increase in nine years of 1,443,000, or 125 per cent. In 1870 the accommodation was equal to 1,878,000; in 1874 to 2,872,000; and in 1879 to 4,142,000, being an increase in the nine years of 2,264,000, or 121 per cent. Notwithstanding that very large increase, and notwithstanding the influence of compulsion, there were still outside the schools between 400,000 and 500,000 children who had not yet been brought under the benefit of instruction. The cost of school buildings had been about 20,000,000*l.*, of which school boards had expended about 13,000,000*l.*

Royal Manchester Institution.—The sixtieth annual exhibition of modern works of art opens to the public this Friday, the 3rd.

Miscellanea.

Colour-Blindness.—Dr. Joy Jeffries has lately reported to the School Board of Boston, U.S., on the result of his examination of 27,927 school children for colour-blindness, with the following general results:—Of 14,469 male students, 608 were colour-blind, or 4·202 per cent.; of 13,458 female students, 9 only were colour-blind, or 0·066 per cent." He adds, "These results are so near what is found by the best observers in Europe that we may take it as the expression of a general law. Colour-blindness is not curable by any known methods, and the colour-sense does not alter through life; hence the statistics gathered from the schools apply to the whole community. We may conclude that one male in twenty-five is more or less colour-blind, and that the defect very rarely occurs among females. I would here again respectfully call the attention of the Board to the fact that whilst something is done in the primary schools in reference to teaching the name of colours, the question of colour-blindness on the part of the boys is entirely overlooked. . . . . In my previous report I spoke of the extraordinary lack of knowledge and use of colour-names by boys. My work in testing since then has still further convinced me that this does not show itself in school life, in examinations or exhibitions. Such want does, however, show itself very quickly when the boy comes out into every-day life and occupations. Thus it is that the necessity of teaching colours and colour-names to boys has been overlooked. . . . . The cultivation of the sense of colour is at present almost wholly neglected, as was once the sense of hearing and the voice. Colour-blindness, of course, has been as unrecognised as unknown. For this no blame can be attached to teachers, or those who direct their efforts. It is only since the colour-sense and its defects have been talked about and tested within the last three years, that here, as elsewhere in the world, it has been discovered that men were quite without the use and knowledge of colour-names compared with women, very much as it was wholly unknown, but equally true, that the latter were so extraordinarily exempt from colour-blindness." The subject of colour-blindness was treated of in the *Builder* many years ago, at a time when the prevalence of the defect was little known.

Encouragement for Workmen.—Messrs. William Denny & Brothers, of the Leven Shipyard, Dumbarton, have issued an intimation to their workmen, in which they state that they have noticed during the last two years many improvements in the methods of the work and appliances introduced by their workmen into their yard. They state that they very readily recognise the advantage accruing to their business from these efforts of skill, and they are desirous that they should not pass unrewarded. They have therefore decided that the authors of such improvements introduced after this date shall have a claim upon the firm for reward; and to enable these claims to be readily and easily adjusted, they have appointed a committee of awards. The rewards are to be given as follows:—To anyone who has either invented or introduced a new machine or hand-tool into the yard; to anyone who applies existing machinery or hand-tools to a new class of work; to anyone who has discovered or introduced any new method of carrying on or arranging work; or, generally to anyone who has made any change by which the work of the yard is rendered either superior in quality or more economical in cost. The awards are not to be less than 2*l.* and not more than 10*l.*; but the firm may give more if satisfied that the invention deserves it.

Dock Extension in the River Thames.—The works for enlarging Messrs. Hy. Fletcher, Son, & Fearnall's upper dock at the Union Dockyard, Limehouse, are now nearly completed, and last week the works for widening, deepening, and lengthening the middle dock were commenced. The walls will be built of brickwork, backed up with concrete, and the flooring of timber and concrete. The entrance will have an iron caisson. When completed, the dock will measure nearly 360 ft. The whole of the works are being carried out under the superintendence of Mr. E. C. Homer, C.E.

Child's New Banking House.—The massive strong-room doors here, gates, and shutters were, with one exception, designed and supplied by Messrs. Chubb & Sons, and are fitted with their patent locks.

Proposed Art Museum, Manchester.—On the 20th ult., a deputation from the Art Museum Committee waited by appointment on the Parks Committee of the Manchester City Council at the Town-hall, with respect to the scheme for erecting a gallery in Alexandra Park for the reception of certain works of art of the present value of 5,000*l.* Mr. Horsfall gave a general outline of the scheme in question, and stated that a building of the simplest possible construction would, in the first instance, meet the wishes of the Art Museum Committee. Nor were they particular as to its being erected in Alexandra Park; any other of the parks would answer their purpose. He proposed that the Parks Committee should accept the gentlemen at present constituting the Art Museum Committee as tenants for the contemplated building for a period of four years, the City Council to have during that time two representatives on the Museum Committee. It was suggested that at the end of the four years the Corporation should pay the salaries of the curators, and that the management should then be vested in a committee. The Museum Committee agreed that all works of art placed by them in the gallery, except such as were only lent by their owners, should be the property of the Corporation acting as trustees for the citizens, and they undertook to place in the gallery immediately after its completion works of art of the before-mentioned value, and to add thereto, prior to the close of their tenancy, other works worth 5,000*l.* They believed that a gallery suited for the object which they had in view might be built at a cost of 6,000*l.* It was intimated to the deputation that a sub-committee would be appointed to meet the Art Museum Committee for the purpose of discussing the details of the project.

The Cambrian Archæological Society held its annual gathering last week at Pembroke, under the presidency of Mr. C. E. G. Phillips. The principal excursion made during the meeting was to Pembroke Castle and Monkton Priory Hall, the latter building being described by Professor Babington. Some of the excursionists visited St. Mary's Church, Pembroke, which was described in a paper by the Rev. W. Coddington. Professor Babington, in speaking at a meeting in the Town-hall, said that Pembroke Castle originally consisted of two wards, or large inclosures within the walls. The position of the dividing wall was shown by a ridge, under which, doubtless, were the foundations of the wall. In the inner wall there was a magnificent Norman tower, such a one as he did not believe existed anywhere else in the United Kingdom. This tower was surrounded by openings in the outer shell, which were intended as sockets for beams to support platforms, from which stones, hot lead, and such missiles might be cast upon a besieging party by those within. With regard to that portion of the castle which was generally called the chapel, he gave his decided opinion that that room was not the chapel, but the hall, where the head persons of the castle took their food, and probably slept upon the floor. The castle appeared to have consisted of three courts, in addition to the keep itself, so giving a very great power of resistance. Monkton Hall was being altered, and not for the better as far as antiquaries were concerned. The Rev. Dr. D. R. Thomas, late general association secretary, referred briefly to the explorations in Caldy Island. He said that antiquaries would view with sorrow the brewing operations which were being carried on in what had been the chancel of the old Priory Church. Mr. Edward Laws, of Tenby, read a paper dealing with the history and probable uses of the numerous camps and earthworks found in various parts of the county of Pembroke. He said there were eighty-three of them in all.

The Great New Gasholder at Kennington.—At the recent meeting of the South Metropolitan Gas Company, with which the Phœnix Company is now amalgamated, the chairman adverted to the immense gasholder just erected at the Kennington station. He stated that its capacity was greater than that of any similar structure yet erected, being the largest known gasholder at the present time. He added that its total cost, with tank and everything complete, would be about 47,000*l.*, or something under 9*l.* per 1,000 ft. of capacity; the usual price of smaller holders being 18*l.* or 20*l.* for this amount of capacity, showing that its cost is scarcely one-half of the average of those which have hitherto been built.

The Burning of Whitechapel Church.—We briefly mentioned last week that Whitechapel parish church (St. Mary Matfelon) was destroyed by fire on the 26th ult. We gave views of the interior, and of the reredos, in our volume for 1878, pp. 268-269. The church which has been destroyed was entirely new, and was consecrated and opened for service in February, 1877. The building was erected at a total cost of more than 30,000*l.*, out of which a sum of about 10,000*l.* was raised by public subscription, and the remainder was supplied by the munificence of Mr. C. E. Coope, M.P. Prominent among other objects of interest in the church was the organ, constructed by Messrs. Hill & Son. This, as our interior view of the church shows, was carried upwards from the organ-chamber past the clearstory windows, so as to reach nearly to the roof of the nave. When the fire had gained a hold on the body of the organ this front formed a ready means of communicating with the roof, and this will account for the astonishingly rapid progress of the devastating fire. On the day of the fire, according to the rector (the Rev. J. F. Kitto), Messrs. Hill's tuner, with two lads as assistants, were at work in the organ. It is admitted that a benzoline lamp was used by the tuner in order to gain access to the organ, and that a candle was lighted by the lad who blew the bellows. But it is asserted that the lamp was put out at least two hours, and the candle half-an-hour, before the staff left the church at one o'clock for dinner. However this may be, at half-past one the fire was discovered, and upon entry being made the whole of the organ was seen to be in flames. Surely this ought to be a warning, not only to organ-builders, but also to the clergy and to the public. The church was only insured to the amount of 16,800*l.* As we stated last week, Mr. Ernest C. Lee was the architect of the church.

Westerdale Parish Church (near Yarm), has just received a three-light stained-glass east window, the gift of the Rev. J. Rathbone Ellis, the rector, in memory of his late wife and daughter. The subject, occupying all the lights, is the Crucifixion, after the narrative of St. John. At the foot of Jesus on the Cross is the prostrate form of the weeping Magdalene. On either side are respectively the Virgin Mother and the other Mary; St. John and the Centurion, above whom two adoring witness-angels complete the group. The window is from the studio of Powell, Brothers, of Leeds.

City and Guilds of London Institute.—Programmes of the lectures to be delivered at the Cowper-street Schools, Finsbury, are being extensively circulated, from which workmen and others may learn the opportunities there are for acquiring practical scientific knowledge that will be useful to them in their trades. Advertisements, too, are appearing, and we desire to aid in directing attention to this movement on the part of the City and Guilds of London Institute to impart by laboratory and tutorial courses technical education at merely nominal fees. During the last spring term 192 students attended, taking out 353 tickets for the different courses of technical instruction.

Palæolithic Flint Implements.—Dr. Joseph Stevens writes to say that the brief *résumé* we gave of his paper on the discovery of flint implements in the Reading Drift, read before the Archæological Congress at Devizes, does not represent what he said. He has never found implements or animal remains in green-sand, and he did not use Sir John Lubbock's name in connexion with skulls of any kind, but Professor Rolleston's.

Trade School for Society of Merchant Venturers, Bristol.—The treasurer has informed some inquiring would-be competitors that the guinea to be paid for particulars, according to advertisement, will *not* be returned to those who send in designs, and that the Society will not bind themselves to call in a professional referee, or to employ the author of the successful design. This ought to limit the number of competitors.

Liverpool.—Memorial-stones of new Sunday schools in connexion with the Methodist Free Church, Hamilton-road, were laid on the 6th ult. The site of the proposed schools is at the back of the chapel, and when erected the building will accommodate about 400 children. The cost of the schools is estimated at 2,500*l.* This amount, however, includes the expense incurred in placing galleries inside the chapel. The contractor is Mr. William Litt, of Bootle.

Eighteen feet and a-half in Budge-row, City.—A freehold plot of ground, in Budge-row, Cannon-street, with a frontage to the street of 18 ft. 6 in., and containing about 870 square feet (with an old house on it, shortly coming down), was sold by auction on Saturday, at the Mart, by Messrs. Foster, of Pall-mall, for 6,500*l.*—equal to 7*l.* 10*s.* a square foot, or at the rate of 326,000*l.* per acre.

Berlin Academy of Arts.—The fifty-fourth autumn exhibition of this Academy has been opened. It contains about 1,000 objects of painting and sculpture, the former greatly predominating, and including the handiwork of all the chief living German masters, as well as contributions from several well-known English and American artists.

Wood Paving.—The Kensington Vestry have decided to pave the whole of High-street, Kensington, with wood, and have accepted the tender of Messrs. Nowell & Robson, 10,657*l.*

The Simla Art Exhibition is to be opened on September 18th. Lord Ripon presents a prize for the best original picture by an amateur artist.

TENDERS

For new ironing rooms at Milton House, Brompton, for the London Female Preventive and Reformatory Institution. Mr. W. P. Griffith, architect:—

Fricker	£252 0 0
Swan	210 0 0
Dixon (accepted)	166 0 0

For erecting chimney-shaft and retaining walls, at Angel-alley, Bishopsgate-street Without, for Messrs. Allen & Sons. Mr. Geo. Barnes Williams, architect:—

Parrish (accepted)	£265 0 0

For the erection of four cottages in Cardinal-street, Ipswich, for Captain Morton. Mr. Henry G. Bishop, architect:—

Bennett	£900 0 0
Cunnold	737 0 0
Felgate	675 0 0
Moss	637 0 0
Gibbons (accepted)	600 0 0

For the erection of a pair of semi-detached villas in Hampton-road, Ipswich, for Mr. W. Revons. Mr. Henry G. Bishop, architect:—

Pollard (accepted)	620 0 0

For works to Hertford House, Connaught-place, Hyde Park. Messrs. Davis & Emanuel, architects:—

For General Repairs.

Phillips & Son	£1,300 0 0
Burdett & Sons	1,288 17 0
Colls & Sons	932 0 0
Ashwell & Stevenson	898 0 0

For Decorative Works.

Hackforth	693 12 0
Phillips & Son	686 0 0
Burdett & Sons	640 10 0
Mellier & Co.	487 3 0
Ashwell & Stevenson	433 0 0

For Sanitary Works.

Ashwell & Stevenson	440 0 0
C. & F. Mansfield	402 15 2

For repairs and alterations to Woodlands, Streatham, for Mr. R. H. Measures. Mr. F. Carter, architect:—

Smith	£1,650	11 weeks
Newstead (accepted)	1,470	10 ,,
Markwell	1,316	15 ,,
Cantell (part only)	922	8 ,,

For farm buildings, &c., proposed to be erected at North Forty Farm, Sudbury, Middlesex, for trustees of Mr. Young. Mr. A. R. Stenning, architect. Quantities by Messrs. Linsdell & Giffard:—

	If timbered and boarded.	If brick built.
Farm Buildings.		
Batchelor, Sudbury	£1,820	£1,916
Hussey, Harrow	1,730	1,860
Vears & Co., London	1,675	1,832
Nye, Ealing	1,543	1,578
Adamson & Son, Turnham Green	1,525	1,596
Haynes, Alperton	1,380	1,410
House.		
Vears & Co.	£1,218 0 0	
Batchelor	1,107 0 0	
Adamson & Sons	1,100 0 0	
Nye	1,077 0 0	
Hussey	1,068 0 0	
Haynes	950 0 0	

For the erection of six houses, Coleman-street, Southampton, exclusive of smith's work and ironmongery. Mr. W. H. Mitchell, architect:—

Dyer	£1,296 0 0
Rowland	1,272 0 0
Chapman	1,194 0 0
Crook	1,147 10 0
Stevens & Son (accepted)	1,133 0 0

For alterations and additions to the carpet manufactory of Messrs. B. Woodward & Co., Mill-street, Kidderminster. Mr. J. Mossop, architect. Quantities by the architect:—

Building.

Thompson	£1,999 10 0
Binman & Son	1,584 0 0
Smith	1,515 0 0
Guest	1,310 0 0
Vale, Kidderminster and Birmingham (accepted)	1,300 0 0
Ironwork.	
Bradley (accepted)	207 10 0
J. & S. Roberts (items per ton)	—

For repairs and redecoration to West Ham Parish Church. Mr. J. T. Newman, architect:—

Gentry	£620 0 0
Cheffins	536 0 0
Reed	483 0 0
Morter	469 0 0
Norton & Son (accepted)	444 0 0

For completing six shops and premises at Willesden, for Mr. David Tildesley. Mr. W. Graves, architect. No quantities:—

Kellond (accepted)	£975 0 0

For erecting new premises, Queen's-road, Bayswater, for Mr. W. Whiteley. Mr. J. E. Saunders, architect. Quantities supplied by Messrs. Osborn & Russell:—

Ashby & Horner	£32,979 0 0
Adamson & Son	31,196 0 0
Sabey & Son	31,150 0 0
Holland & Hannen	30,560 0 0
Lawrence	30,472 0 0
Brass	29,483 0 0

For additions, alterations, and repairs, to Griffin Public House, for Messrs. Reid & Co. Mr. W. Ansell, architect:—

Godden	£2,312 0 0
Shurmur	2,286 0 0
Oxford	2,237 0 0
Richards	2,215 0 0
Patman & Fotheringham	2,150 0 0
Macey	2,088 0 0
Langmead & Way	2,076 0 0
Anley	1,990 0 0
Cocks	1,936 0 0

For the erection of stables and fittings at Honor Oak Park, for Mr. Marshall. Mr. E. Gregg, architect. No quantities supplied:—

Lidstone & Son	£580 0 0
Pritchard	480 0 0
Amer	430 0 0
Watson & Dennett, Dulwich (accepted)	426 17 6

For alterations and additions to No. —, Orchard-street, Oxford-street. Mr. W. D. Church, architect:—

Dove, Bros.	£610 0 0
Shurmur	605 0 0
Godden	571 0 0

For erecting three houses, Astey's-row, River-street, Islington. Mr. W. Smith, architect:—

Mattock, Bros.	£2,172 0 0
Steel, Bros.	2,140 0 0
Harper	1,953 0 0
Shurmur	1,845 0 0

For foundations, &c., Monument-yard. Mr. W. Smith, architect:—

Durnford and Langham	£1,686 0 0
Mattock, Bros.	1,433 0 0
Larke	1,370 0 0
Harper	1,287 0 0
Shurmur	1,260 0 0
Steel, Bros.	1,223 0 0
Crabb	960 0 0

For decorative repairs and alterations to No. 12, Cornwall-terrace, Regent's Park, and to stabling in Cornwall Mews, for Mr. Charles Burge. Messrs. Ebbetts & Cobb, architects:—

Sanders (accepted)	£400 0 0

For fourteen private houses in Friern and Goodrich roads, for Mr. W. Cocking. Mr. C. W. Lovett, architect:—

Eldridge & Gee (accepted)	£5,300 0 0

For five private houses in Lordship-lane, East Dulwich, for Mr. C. Smith. Mr. C. W. Lovett, architect:—

Goad	£4,893 0 0
Fisher, Bros.	4,869 0 0
Croaker	4,390 0 0
Eldridge & Gee	3,868 0 0
Hearsum (accepted)	3,800 0 0

For a pair of semi-detached villas in Friern-road, East Dulwich, for Mr. C. Smith. Mr. C. W. Lovett, architect:—

Fisher, Bros.	£1,625 0 0
Watson & Dennett	1,527 0 0
Eldridge & Gee	1,498 0 0
Goad	1,291 0 0
Hearsum (accepted)	1,224 0 0

For rebuilding premises in High-street, Peckham. Mr. C. W. Lovett, architect:—

Thompson & Son	1,532 0 0
Eldridge & Gee	1,375 0 0
Goad	1,372 0 0
Croaker, Brothers (accepted)	1,283 0 0

For building two shops, High-street, Sutton, Surrey, for Mr. F. Monks. Mr. C. W. Lovett, architect:—

Parkin	£950 0 0
Fisher, Bros.	777 0 0
Eldridge & Gee	770 0 0
Humphreys	740 0 0
Hurbert (accepted)	541 12 0

For building stable, loft, and alteration to shop, for Mr. Illsley. Mr. C. W. Lovett, architect:—

Colls & Sons	£670 0 0
Thompson & Son	578 0 0
Eldridge & Gee	494 0 0
Croaker, Bros.	491 0 0
Goad	477 0 0
Fisher, Bros.	459 0 0

For altering shop for Mr. Lomas, Choumert-road. Mr. C. W. Lovett, architect:—

Peto	£249 0 0
Goad	195 0 0
Eldridge & Gee (accepted)	187 0 0

For alterations and additions to the Town-hall at Newbury, Berks. Mr. J. H. Money, architect. Quantities by Messrs. Curtis & Sons:—

Crook	£863 0 0
Nightingale	823 0 0
James	749 17 4
Harrison	739 14 0
Elliot	724 2 0
Simonds	672 0 0
Morter (accepted)	654 0 0

For completing four shops and dwellings, being Nos. 403, 405, 407, and 409, Portobello-road, Notting-hill, and four stables in the Mews in the rear thereof, for Mr. H. P. Landon and Mr. G. H. Tatham. Messrs. Ebbetts & Cobb, architects. No quantities supplied:—

King & Walker	£2,890 0 0
Holt	2,648 0 0
Burman	2,600 0 0
Shapley	2,360 0 0
Carmody	2,189 0 0
Sanders	2,092 0 0

For alterations and additions to No. 60, Hickman's Folly, Dockhead, for Mr. J. Watts. Mr. E. Crosse, architect:—

Tyler, Jamaica-road (accepted)	£405 0 0

For building ten houses for Messrs. Bliss & Sons. Mr. Charles Dunch, architect:—

Taylor & Parfitt	£2,899 0 0
Shurmur	2,880 0 0
Johnson	2,694 0 0
Wood	2,542 0 0
Wire	2,500 0 0
Higgs	2,345 0 0

For alterations to the Rose and Crown Tavern, Cullum-street, for Mr. H. Watson. Mr. W. J. Miller, architect:—

Higgs	£373 0 0
Adams (accepted)	347 0 0

For a new Infirmary, for the Guardians of the Barnsley Union. Messrs. Dixon & Moxon, architects:—

	Local Stone.	Brighouse Stone.
Powell & Sons, Sheffield	£22,234	£23,374
Howell & Son, Bristol	—	22,900
Whiteley, Leeds	20,700	21,000
Nicholson & Son, Leeds	19,413	20,197
Raynor, Barnsley	—	18,929
Longden & Son, Sheffield	18,487	18,881
Robinson & Son, Barnsley	18,030	18,750
Chadwick & Co., Rotherham	17,879	18,629
Brier, Sons, & Wilson, Dewsbury	17,023	17,399
Fidler, Eckington	16,950	17,380
Taylor & Sons, Barnsley	16,450	17,350
Armitage & Hodgon, Leeds	17,030	17,330
Humphreys & Moulson, Bradford	16,653	17,103
Bustard, Barnsley	—	16,895
Hinchliffe & Moore,* Barnsley	15,197	15,687

* Accepted, Brighouse Stone.

For rebuilding the county bridge over the Ravensbourne, at Deptford. Mr. F. W. Ruck, county surveyor. Quantities by Messrs. Ruck, Son, & Smith:—

	Con. No. 1. Ironfounder's Work.	Con. No. 2. Builder's Work.
Finch & Co., Chepstow	£3,020 0 0	—
Hanna, Donald, & Wilson, Paisley	2,760 0 0	—
Stockton Forge Company, Stockton	2,374 3 8	—
Webster, London	2,155 0 0	£4,331
Butler, Stanningley	2,039 7 0	—
Butterley Iron Company	2,022 17 0	—
Dixon, London	2,000 0 0	2,000
Weeks & Son, Maidstone	1,963 19 8	—
Cochrane & Co., near Dudley	1,941 0 0	—
Maxwell, London	1,921 0 0	2,300
Cooke & Co., London	1,893 0 0	2,175
Tees Side Ironworks, Middlesboro'	1,736 3 7	—
Wilson, Brothers, & Co., London	1,685 0 0	—
Ball & Gammon,* Gillingham	1,663 0 0	2,080
Shaw & Co., London	1,649 15 0	2,220
Jukes, Coulson, Stokes, & Co., London	1,406 0 0	—

* Accepted.

For constructing road and retaining walls at Rochester, for the Trustees of St. Bartholomew's Hospital. The late Mr. G. Ruck, surveyor. Quantities by Messrs. Ruck, Son, & Smith:—

Calland & Son, Rochester (accepted)	£990 0 0

For the erection of two shops and dwelling houses in Week-street, Maidstone, for Messrs. Gegan. Messrs. Ruck, Son, & Smith, architects. Quantities supplied:—

Bishop, Birling	£1,770 0 0
Naylar, Rochester	1,747 0 0
Cox, Brothers, Maidstone	1,730 0 0
Bridge, sen., Maidstone	1,720 0 0
Avard, Maidstone	1,695 0 0
Elmore, Maidstone	1,676 0 0
Vaughan, Brothers, Maidstone	1,637 0 0
Wallis & Clements,* Maidstone	1,594 0 0

* Accepted.

For the erection of a shop and dwelling-house, West Borough, Maidstone, for Messrs. Hammerton. Messrs. Ruck, Son, & Smith, architects. Quantities by Mr. T. Ladds:—

Cox, Brothers, Maidstone	£1,409 0 0
Avard, Maidstone	1,360 0 0
Naylar, Rochester	1,350 0 0
Vaughan, Bros., Maidstone	1,342 0 0
Wallis & Clements,* Maidstone	1,332 0 0

* Accepted

For the construction of a brick and concrete reservoir, filtering-chamber, &c., and the providing and laying of 6,500 yards run of cast-iron pipes, at Budleigh, Salterton, Devon. Mr. C. W. Whitaker, engineer. Quantities supplied:—

Willey	£5,867 0 0
Kerslake	5,550 0 0
Facey	5,500 0 0
Painter	5,193 0 0
Gould	4,916 0 0
Stephens & Bastow	4,795 0 0
Bell	4,795 0 0
Hawkins & Best	4,582 0 0
Shaddock	4,567 0 0
Coldridge	4,477 0 0
Phillips	4,394 0 0
Crockam	4,110 0 0
Small	4,000 0 0
Gibson (accepted)	3,620 0 0

For road making at Upper Holloway. Mr. Charles Higgins, surveyor:—

Girdlestone-road.

Waddingham, Upper Holloway	£422 0 0
Rutty, Bromley-by-Bow	394 0 0
Taylor, Upper Holloway	389 0 0
Williamson, Islington	373 10 0
Pizzey, Hornsey	350 12 0
Wilson, Chiswick	330 0 0
Irons, Dalston	324 12 0
Walker, Upper Holloway (accepted)	320 0 0

Langdon-Road.

Waddingham	414 0 0
Rutty	379 0 0
French	365 5 0
Taylor	361 0 0
Pizzey	336 8 0
Wilson	321 10 0
Williamson	317 10 0
Irons	313 1 0
Walker (accepted)	310 0 0

Hargrave Park-Road (part of).

Taylor	470 0 0
Irons	458 2 0
Waddingham	450 0 0
Rutty	447 0 0
Wilson	389 0 0
Williamson	358 10 0
Walker (accepted)	320 0 0

Anatola-Road.

Waddingham	307 10 0
Rutty	298 0 0
Taylor	287 0 0
Wilson	265 17 0
Irons	261 15 0
Walker	240 0 0
Williamson (accepted)	235 10 0

Magdala-Road.

Waddingham	297 10 0
Rutty	286 0 0
Taylor	270 0 0
Pizzey	262 8 0
Wilson	260 17 0
Irons	240 15 0
Walker	235 0 0
Williamson (accepted)	231 10 0

Annesley-Road.

Waddingham	189 10 0
Rutty	186 0 0
Taylor	174 0 0
Pizzey	165 19 6
Wilson	161 5 0
Irons	155 0 0
Walker	145 0 0
Williamson (accepted)	139 10 0

For the erection of the Charter House-lane School (for 760 children), for the Kingston-upon-Hull School Board. Mr. W. Botterill, architect. Quantities supplied:—

	No. 1.—Board to retain Old Buildings upon the Site.	No. 2.—Contractor to take the Old Buildings.
Grasseley	£6,415 0 0	£6,215 0 0
Goates	5,794 14 0	5,694 14 0
Habbershaw & Son	5,667 11 10	5,473 15 0
Skinner	5,585 0 0	5,420 0 0
Marsden & Hodson	5,419 7 0	5,349 7 0
Beevers	5,427 0 0	5,297 0 0
Drury & Harper	5,382 8 0	5,282 8 0
Sergeant	5,340 0 0	5,240 0 0
Hockney & Liggins	5,381 0 0	5,205 0 0
Brown	5,313 8 6	5,183 0 0
Southern	5,272 19 0	5,133 3 0
Wilson, Bros.	5,213 15 6	5,013 15 6
Musgrave	5,990 0 0	4,790 0 0
Jackson & Son*	5,050 0 0	4,750 0 0

* Accepted. All of Hull.

For sundry works at the Spread Eagle, Stangate-street, Lambeth. Mr. W. C. Banks, architect:—

For New Girder and Alterations.

Tarrant & Son	£259 0 0
Sharp & Everard	198 0 0
Elliot (accepted)	185 0 0

For Bar Fittings.

Warne	243 0 0
Watts & Co.	241 7 0
Elliott (accepted)	237 10 0

For repairs and additions to house and new shop on the Forecourt, 194, Southwark Park-road, for Mr. John Morgan. Mr. E. Crosse, architect:—

Almond, Jamaica-road	£575 0 0
Eldridge & Gee, Fendall-street	468 0 0
White, Peckham-rye (accepted)	432 0 0

For repairs and redecoration to St. John's Church, Broadway, Stratford. Mr. J. T. Newman, architect:—

Repairs and Redecoration.

North, Bros.	£550 0 0
Hoskings	529 0 0
Morter	461 0 0
Norton & Son (accepted)	452 0 0

Gas Engineering.

Carter	85 0 0
Land & Co.	80 0 0
Wentworth	73 0 0

For alterations and repairs to 15 and 17, Old Montague-street, Whitechapel, for Mr. G. Burnell. Mr. J. T. Newman, architect:—

Knightly (accepted)	£589 0 0

For the completion of Arundel-road, Harold Wood Estate, Essex, for Mr. J. Compton. Mr. J. T. Newman, architect:—

Jackson	£348 0 0
Harris	351 0 0
Pound (accepted)	306 0 0

For stable, coach-house, &c. at Wanstead, for Mr. H. Compton. Mr. J. T. Newman, architect:—

Cleavers	£220 0 0
Reed	180 0 0

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